ELECTRICAL REVIEW

[ILLUSTRATED.]

A WEEKLY JOURNAL OF

ELECTRIC LIGHT, TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

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Electric Lights for Signals at Sea.

A suggestion was recently made by M. E. Genglaire, for finding the range on board an iron-clad at night. The plan is to place an arc light on each extremity of the iron-clad, and converge their beams on the distant object. The angles made by the beams with the base-line are observed, and a simple trigonometrical formula gives the distance of the object. To facilitate the operation, the vessel can be brought round till the angles are equal, or nearly so, and a table can be used to give the result. The incandescent electric light has also been applied recently in the French fleet to signal by night. A string of incandescent lights are hung on the yards of the vessels corresponding, and their lights eclipsed, either according to the Morse telegraphic code of long and short flash signals, or according to the code of marine signals, as the case may be. For the latter combinations, ten lamps are required, the current being sent through different numbers of the lamps

A Suggested Change in the Morse Alphabet.

To the Editor of Electrical Review:

Having had some experience in telegraphing I have come across a symbol which I think would be suited to the letter "L" It is this . . . . , or, dot, space, two dots, space, dot. Though it sounds somewhat as the telegraphic J, I think that it could be used for L with little trouble.

Very Respectfully,

Brooklyn, July 26. M. R.

That Mythical Edison Balloon.

To the Editor of Electrical Review:

In your issue of July 16th appeared an article headed, "How Edison Fooled the Sailor." On the strength of that I wagered that the very brilliant light seen nearly every night in the west was Edison's electric star, or was an artificial light. A friend wagered it was a planet, and that Edison never exhibited any such light. We wrote to the *Sun*, and answer came that it was a planet. I paid the bet. Will you kindly answer if Edison ever did suspend a light from a balloon in Llewellyn Park, and oblige

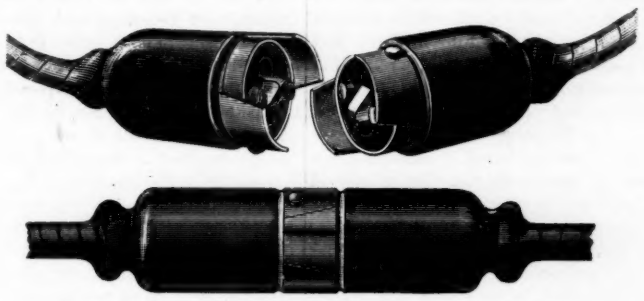
J. N. B.

Brooklyn, N. Y., July 26.

ANSWER.—No. Mr. Edison has used balloons for the purpose of testing the distance electric signals by induction could be sent at great heights, but has never sent up an electric light in a balloon from Llewellyn Park, or any other place, to our knowledge. Sorry to find that our correspondent was misled by the article. He paid the bet, however, like a man.

A New Electric Train Signal.

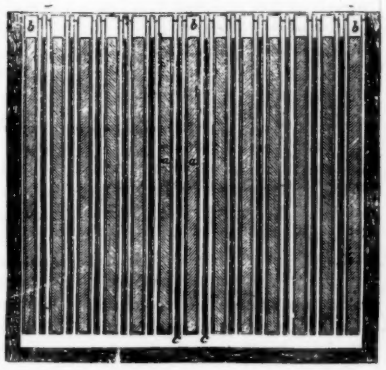
The Acme Railway Appliance Company, of Boston (40 Pearl Street), own the patent for an electric train signal, by use of which reliable communication under all necessary circumstances can be maintained between the conductor and an engineer of a railway train in motion or at rest. This instantaneous method of signals is equally available for use on long or short passenger and freight trains, and will make it sure and easy for the conductor to instantly notify the engineer to start or stop his train, or to increase or slacken speed. Another great function of this reliable apparatus is to notify the engineer automatically by a loud electric alarm in the cab of the locomotive, if in turning curves, crossing bridges, or from any other cause the cars in a train should become separated or broken apart. This ingenious yet simple apparatus can be maintained in operation at very slight expense. All its mechanism is enclosed in

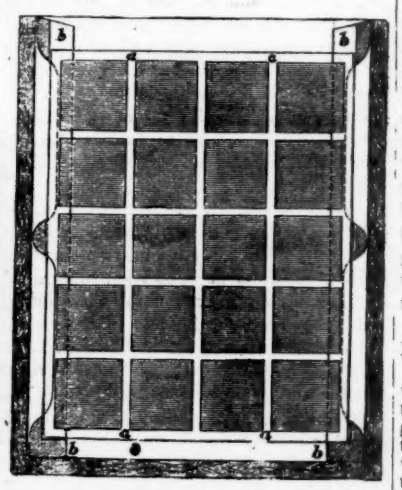


ELECTRIC TRAIN SIGNAL OF THE ACME COMPANY, BOSTON.

and protected by a hard rubber casing; its contacts are contained in air-tight chambers, and all its parts and details arranged so as to meet all probable contingencies. Batteries alone are not depended on for the source of power, as this company claims the exclusive right to generate its electric power by a dynamo electric generator operated by steam from the locomotive to an open circuit train signal. Among the claims made are the following:

First. As the entire mechanism of this system is enclosed within a hard rubber casing, provided with interlocking metallic flanges, it is protected completely from sleet, snow, ice, rain, dust, etc., and therefore its action cannot be effected by them.





PLATES OF THE SMITH STORAGE BATTERY.

Second. Having double-acting automatic contacts enclosed in air-tight chambers, its operation is positive, and action certain.

Third. It has sliding rods of phosphor bronze, which, when the signal is coupled, causes the rods to come in contact with each other, and thereby continues the open circuit, and when broken apart closes the circuit automatically.

Fourth. It has a centrally located locking device constructed in such a manner that a sudden or rapid detachment of its members cannot disorder its action or mechanism.

Fifth. When its members are coupled, they cannot be detached except in the manner intended; namely, by automatic or manual action.

Sixth. Its arrangement of parts is so simple, and its construction so natural, both in a mechanical and electrical sense, that it is in every way a perfect train signal.

On any train to which this apparatus is applied, the bell rope has neither place nor function.

Method of Measuring the Counter E.M.F. in the Electric Arc.

The method of measurement is a modification of that adopted by Cohn for the determination of the polarization of a cell, and consists of a particular arrangement of a Wheatstone bridge. Two branches contain each a fixed resistance; the third a variable resistance; in the fourth are joined up in series a battery of accumulators, a safety fuse, a key, a variable resistance, an ammeter, and the arc lamp, the carbons of which can be short-circuited, while the regulating solenoid still remains in the circuit. One diagonal contains a Siemens torsion galvanometer, the fixed coil of an electro-dynamometer and a variable resistance. The other diagonal contains the secondary coil of an induction apparatus. The circuit of the swinging coil of the electro-dynamometer is completed through another secondary coil, the primary of which is in circuit with a Dubois apparatus, and with an ordinary interrupter.

A measurement is first taken with the arc in circuit, and the resistances are so arranged that the deflection of the electro-dynamometer remains constant when the induction apparatus is set to work. Then the carbons are short-circuited, and an equivalent resistance inserted in place of them. Only two measurements are given in the paper: in one, with a current of 3.4 amperes and an E.M.F. of 40.6 volts, the resistance of the arc was 2.1 ohms; in the other, with 4.1 amperes and 39.6 volts, the resistance was 1.6 ohm.

No mention is made of the length of the arc in either case.

Cornelius Smith's Storage Cells.

We illustrate herewith a form of secondary battery which has been introduced by Mr. Cornelius Smith, and we also print below an extract from a report upon the cell made by Mr. L. B. Miller, A.S.T.E. From this it will be seen that the only new feature of the cell consists in the use of thin pieces of lead foil, which are packed edgewise in rectangular holes. The lead slips for the negative plates may either be painted with red lead before introduction, or both plates may be made of plain lead and formed as in the Planté battery. The lead slips are packed somewhat tightly in the first instance, and the expansion produced in charging wedges them firmly in, while all tendency to buckle is obviously avoided. This construction is an undeniable improvement over previous cells of the same general type, says the London *Electrician;* but we do not feel called-upon to express any opinion as to whether or not the construction is sufficiently novel to steer clear of existing patent rights. We may, however, point out that in the Smith cell contact is made with the grid by every separate lead slip, while in the Elieson type, which it most nearly resembles, contact with the grid is obtained only upon the outer surface of each roll of lead tape, and the current taken off has to traverse all the external convolutions of the roll.

Some cells of this description have been in use for some time at Whiteley's, in Westbourne Grove, and Mr. Percival, who is in charge of the electrical department there, speaks very highly of their behavior. We have had also an opportunity of examining some plates which had been in use about three months, and which seemed to be in very good condition, being well formed throughout. Speaking generally, we have been very favorably impressed with the battery, and as against other cells in which a grid is used with the negative plate we are under the impression that this is the best arrangement hitherto devised.

The following is an extract from Mr. Miller's report above referred to:

The accumulators consisted of 12 cells, with three plates in each, one positive and two negative. The plates consisted of a grid of cast lead about 5½ by 3½, with rectangular spaces an inch square, filled up with thin lead strips placed loosely one on the top of the other. In the cells submitted for testing, which were intended for lighting purposes, the lead strips had been painted with red lead before being packed in, and red lead had also been pressed into the strips from the surface of the plate. The strips made excellent contact with the frame, and although they were packed more tightly than I should consider advisable, on breaking a plate to pieces I could see that the interior surface of the strips was becoming active, although the cells were far from being fully "formed." The value of an accumulator depends chiefly on the following points:

1st. *The efficiency—i.e.*, the percentage of electricity that can be got out compared with what has been put in.

In these figures *a* is a grating with rectangular openings, which are filled in the manner described with strips of lead. The plates *a*, when so made and filled up, are inserted into grooves formed in guides *b*, made of vulcanite or other suitable non-conducting material. *c c* are perforated sheets of vulcanite or other material, which, placed between each pair of plates, serve to prevent their circuiting by reason of dirt or scaling.

2d. *The capacity—i. e.*, the quantity of electricity that can be stored in a cell of a given size and weight.

3d. *The life* of the cells—*i. e.*, the rate at which they deteriorate with usage.

The Smith and Mensing accumulator comes up to these requirements, in my opinion, to the following extent:

Efficiency.—The electrical and chemical action in these cells is exactly the same as in others formed of lead plates, and their efficiency is the same, *i.e.*, it ranges between 50-80 per cent. of useful return, depending on the rateof discharge.

Storage Capacity.—This depends on the quantity of active materials, spongy lead, and lead peroxide there is in the cells. To obtain a large quantity a large surface must be exposed to the action of the current; but it has been found in practice very difficult to combine this with the necessary amount of mechanical strength in the plates to make them stand ordinary usage in installations. In the accumulators submitted to me this requirement of large surface is very well met, and without in the least weakening the plates. The current is able to penetrate into the spaces between the strips and make the whole of their surface active, the only effect of the resulting expansion being to make the strips fit the space they occupy more tightly and make better contact with the frame. The result is of very great importance as the failure of accumulators is nearly always due to "buckling" and consequent short-circuiting, the buckling being due to the unequal expansion of the two sides of the plate causing it to assume a curved form. I have charged and discharged the new accumulators at about four times the usual rate without them showing the least signs of "buckling."

Life of the Cells.—I am convinced the accumulators will give highly satisfactory results in this direction, as two of the worst causes of destruction, "buckling" and falling out of the peroxide, are not likely to occur.

Speaking generally, I consider the new accumulator to be a good and sound cell, and one likely to give satisfaction in working.

The following details are given as to one particular type of these cells:

Description of Cells.			
	No. of Plates.	13	
	Material of Box.	Vulcanite in Teak or Glass.	
Working Rate.	Charge Amps.	30—40	
	Discharge Amps.	" to 45	
Capacity.	Ampere Hours.	400	
External Dimensions.	Length Inches.	9	
	Width Inches.	8	
	Height Inches.	9	
	Height over all.	10	
Complete with Acid About		65 lbs.	
Weight.			

Dogs Killed by Electricity.

The morning of July 16th was an eventful one in the history of dogdom, says the Buffalo *Express*. Twenty-seven luckless captives, whose term of probation had passed, were offered up on the electric altar. The new form of execution dispenses altogether with the "dull thud," the "sharp report," and the "loud splash." One by one the doomed dogs were led from the kennel room to the chamber of death. One by one they were placed in a box about two by three, lined with tin, with about an inch of water in the bottom. One by one they were muzzled with a wire running through the mouth. A simple touch of the lever—a corpse. The work of extermination was witnessed by Drs. McMichael, Wende, Park, Fell, and others, all of whom expressed delight at the expedition with which the work of destruction was performed. At present only three or four dogs, of evident good social standing, remain at the pound. The fresh crop will probably be harvested soon.

The New Law Relating to Electrical Conductors in the City of New York.

SEC. 1. From and after the passage of this act and until the first day of November, eighteen hundred and ninety, the board of commissioners of electrical subways in and for the city and county of New York, heretofore appointed under authority of the act chapter four hundred and ninety-nine of the laws of eighteen hundred and eighty-five, together with the mayor of said city, for the time being, are hereby constituted the board of electrical control in and for the city of New York. Each of the said commissioners (except the said mayor) and each of his said successors in office, is and shall be removable for cause, but only upon notice and after an opportunity to be heard by the Governor of this State, who shall have power to fill any and all vacancies, however caused, in the office of either of the commissioners hereinbefore named (except the mayor). The salary of each of the said commissioners (except the mayor), and of their successors, or either of them, shall be five thousand dollars per annum, payable as provided by the said act as amended by the act chapter five hundred and three of the laws of eighteen hundred and eighty-six, passed May twenty-nine, eighteen hundred and eighty-six. All the powers and duties conferred or imposed by the said act chapter four hundred and ninety-nine of the laws of eighteen hundred and eighty-five, upon the commissioners appointed thereunder in and for the city of New York, and all the powers and duties heretofore by any law conferred or imposed upon the local authorities of said city, or any of them, in respect to or affecting the placing, erecting, construction, suspension, maintenance, use, regulation or control of electrical conductors or conduits or subways for electrical conductors in said city are hereby transferred to and conferred and imposed upon, and shall hereafter be exclusively exercised and performed by the said board of electrical control, constituted as provided in this act, and its successors as hereinafter provided.

SEC. 2. The board of commissioners of electrical subways in and for the city of New York, appointed under authority of the act chapter four-hundred and ninety-nine of the laws of eighteen hundred and eighty-five, are hereby required and directed to turn over and deliver to the said board hereinbefore constituted, within ten days after the passage of this act, all maps, plans, models, books and papers relating to the construction and location of electrical conductors, conduits or subways filed with or communicated to said commissioners and all of their official papers of any kind.

SEC. 3. Whenever, in the opinion of the board hereinbefore constituted, in any street or locality of said city a sufficient construction of conduits or subways underground shall be made ready under the provisions of this act, reference being had to the general direction and vicinity of the electrical conductors then in use overhead, the said board shall notify the owners or operators of the electrical conductors above ground in such street or locality to make such electrical connections in said street or through other streets, localities or parts of the city with such underground conduits or subways so specified as shall be determined by the said board, and to remove poles, wires, or other electrical conductors above ground and their supporting fixtures or other devices from said street and locality within ninety days after notice to such effect shall be given. This provision is made a police regulation in and for the city of New York, and in case the several owners or operators of such wires and the owners of such poles, fixtures or devices, shall not cause them to be removed from such street or locality as required by such notice, it shall be the duty of the commissioner of public works of said city to cause the same to be removed forthwith by the bureau of incumbrances, upon the written order of the mayor of said city to that effect.

SEC. 4. It shall be unlawful after the passage of this act for any corporation or individual to take up the pavements of the streets of said city, or to excavate in any of said streets for the purpose of laying under ground any electrical conductors unless a permit, in writing therefor, shall have been first obtained from the said board, or its predecessor, and except with such permission, no electrical conductors, poles or other figures or devices therefor, nor any wires, shall hereafter be continued, constructed, erected or maintained or strung above ground in any part of said city. The said board of electrical control may establish, and from time to time may alter, add to or amend all proper and necessary rules, regulations and provisions for the manner of use and management of the electrical conductors, and of the conduits or subways therefor constructed or contemplated under the provisions of this act, or of any act herein mentioned.

SEC. 5. From and after the first day of November, eighteen hundred and ninety, all rights, powers, and duties vested or existing in the said board of electrical control by this act created, or in the board of commissioners of electrical subways, heretofore existing in said city shall vest in and shall thereafter be held and exercised by the commissioners of the sinking fund in the city of New York.

SEC. 6. The agreement made by and between the commissioners of electrical subways for the city of New York and the Consolidated Telegraph and Electrical Subway Company (a corporation duly organized and existing under the laws of this State) under date of July twenty-seventh, eighteen hundred and eighty-six, when and as amended and modified by a second and further contract or agreement between the said parties dated the seventh day of April, eighteen hundred eighty-seven, is hereby ratified and confirmed, subject, however, to all the provisions of this act. But if at any time or for any reason the said agreement so amended shall be or become inoperative or ineffectual for the accomplishment of its just purpose and the purposes of this act, or if the said company shall be unable, or after reasonable notice and opportunity given by the said board or its successors, it shall fail or decline to comply with or carry into effect the said agreement in all its terms, then in such event the said board or its successors may, with the approval of the mayor and the counsel to the corporation of the city of New York, make such new, further or different contracts with the same or other parties as may be reasonable or necessary to carry into effect the provisions and intent of this act.

SEC. 7. In case, and whenever it shall be made to appear to the satisfaction of any of the justices of the Supreme Court, or any judge of the Court of Common Pleas in and for the city and county of New York, or any judge of the Superior Court of the City of New York, or to the satisfaction of either of said courts, that the said board constituted by this act or its successors, or any officer or agent of said board or its successors or the said The Consolidated Telegraph and Electrical Subway Company or any corporation or persons claiming under the said board or its successors, or under the said company, shall have violated or shall have failed to observe and fully perform or to carry into full effect all or any of the provisions of this act or of either of the acts hereinbefore mentioned or of the said agreement, or shall have failed to furnish just and equal facilities under this act or the said agreement to any and all corporations lawfully competent to manufacture, use or supply electricity, or to operate electrical conductors in any street, avenue or highway in the city of New York, applying for such facilities upon terms that to the court shall appear just and reasonable, then and in every such case said judge or justice or court may, by proper proceedings in the nature of a writ of mandamus or by mandamus, enforce the provisions of this act or of the acts before mentioned, or of the said agreement or of any agreement made under the said acts, or compel the granting of such facilities, or may grant such relief as may be proper in the premises. And the said board or its successors, or the mayor, aldermen and commonalty of the city of New York, or any person, company or corporation aggrieved by any such violation or failure as aforesaid, shall be entitled to institute and maintain such proceedings as are by this section authorized.

SEC. 8. At any time after the first day of January, eighteen hundred and ninety-seven, if the commissioners of the sinking fund in said city may deem it advisable so to do, they may purchase the subways then constructed by said company and the contracts and other property held or owned by said company, for any of the purposes of its incorporation; such purchase to be for and in the name of the mayor, aldermen and commonalty of the city of New York, at such price not to exceed the actual cost of the property so purchased, with ten per cent. added to such cost, as may be or may have been agreed upon between the said company and the said commissioners or their successors. The payment therefor shall be made within four months after the delivery to the comptroller of said city, of good and sufficient and duly executed instrument or instruments of conveyance or transfer to the said mayor, aldermen and commonalty of the said city, such transfer, however, to be subject to any valid liens then thereon outstanding, not exceeding fifty per cent. on the actual cost of such subways, and subject to all leases or contracts for the use of such subways then existing. In order to raise the money necessary to pay for said property so purchased, the comptroller of said city shall issue bonds of said city upon such terms as to rate of interest and time of payment as he shall be directed by said commissioners of the sinking fund to issue.

SEC. 9. All acts and parts of acts inconsistent with this act are hereby repealed.

SEC. 10. This act shall take immediate effect.

Execution by Electricity.

Death caused by a powerful electric current is substantially the same thing as death by lightning stroke. It is instantaneous and painless, for no opportunity is afforded for any sensation to be recognized. In order that the brain may take cognizance of any impression transmitted to it by the nerves, a measurable period of time is required. This Prof. Helmholtz estimates at one-tenth of a second, so that if, for example, the finger be pricked with a pin, this interval is required for the sensation to be telegraphed, so to speak, to the brain. If, then, death can be caused in less than one-tenth of a second, it follows, necessarily, that, no matter how great the pain otherwise might be, it is impossible for it to be felt. As to the deterrent influence of this form of execution upon the lawless classes, it is believed that no other mode of inflicting death could inspire stronger fear. Even those accustomed to deal with electricity every day of their lives can not divest themselves of an undefined impression of mystery, which seems to surround the form of energy, of the very nature of which all men are ignorant. The lack of popular knowledge of even the most elementary electrical laws is remarkable, and this deficiency is by no means confined to the illiterate masses. People still attribute to electricity almost every out-of-the-way natural phenomenon which they cannot understand, as much as they did 100 years ago. Electro-biology, odic force, psychic force, mesmerism and all the other shadowy theories based on odd psychical or physical manifestations or coincidences are ascribed to electricity as freely to-day as they were before Franklin, Lavoisier, Bailly, Guillotin, and the remainder of that famous committee, administered their crushing blow to Mesmer's electrical pretensions. No death is more dreaded than that which is mysterious. "Died by a visitation of Providence," we say, when the mystery cannot be fathomed. The swift obliteration of life following certain failures of vital organs causes the utmost apprehension. We add to the litany a prayer for deliverance from "sudden" death. From the very earliest ages, superstitions of almost every conceivable form and character have clustered about the lightning stroke; and many of them still survive. It is not difficult to conceive that the instant extinction of life in a strong man by an agency it is impossible to see, which is unknown, may create in the ignorant mind feelings of the deepest awe and horror, and prove the most formidable of all means for preventing crime.—*Park Benjamin in the Forum.*

Electricity Applied to the Treatment of Ore.

The *Mining Review* states that for years Dr. J. H. Rae, of Boston, has been studying and experimenting with the subject of electricity and its application to ore treatment. He was one of the first, if not the first, who became convinced and was able to demonstrate, that electricity could be advantageously applied in the treatment and milling of ore and the result shows that henceforth it is to be recognized as an important factor in mining operations. The following is good evidence in its favor:

"We have several times of late mentioned the work being done at the Douglass Mill, Dayton, Nev., with Dr. Rae's 'Electric process' of working ores and tailings. It was at first tried on tailings with a view of recovering the mercury which had been lost. But it has been found even more efficient in working ores by preventing loss of mercury and amalgam.

"The engraving shows the appliances used at the Douglass Mill. The dynamo is run in the ordinary way by the mill engine, and the wires are led to the wooden pan in which the ore is worked. One electrical current is applied through the ring anodes and the other current is applied at the bottom. The solution used overcomes the resistance to the electric current. The ring at the bottom is a perforated gas pipe through which passes a sufficient current of water to clean and wash off the lighter particles. Any quicksilver or silver which may float over is caught in the channel or trough encircling the pan as it overflows. In drawing off the settlers they have only clean material to deal with. For successful work the volt and ampere force have to be carefully adjusted.

'The dynamos in use at the Douglass Mill are capable of operating seven settlers. Two new ones are being built for this mill to give the full capacity of sixteen settlers. The mill works 135 tons of ore per day. It is stated that the decrease in the cost of chemicals for a silver mill is twice the cost of treatment and power when this new process is used. In the Douglass Mill it has cut down the cost of chemicals one-half, and does better work. The main feature is in the reduction of loss of mercury. It has been tried for a couple of months in the Douglass Mill, and is said last month to have effected a saving of some $5,000 over the ordinary methods.

"Dr. Rae has just made his arrangements in the East for wire, and will soon be ready to contract for the necessary appliances. The plant will be furnished on a royalty or number tons of ore crushed, the appliances, however, to be purchased. The mechanism is made in this city by the Pacific Iron Works and California Electrical Company.

"This process is not new, but the system has just been completed and made successful. Dr. Rae obtained two patents in 1867, one in 1868, one in 1869, and another in 1872, besides the recent patents. The success is really the result of a series of failures, which yielded nothing but experience. The recent trials, however, satisfy the inventor and the others interested that the process is now perfect. The English and colonial patents on this electric system of metallurgy have been sold to an English company, and the Mexican territory has also been sold. In a short time the process will be introduced in other mills."

The Advantages of Train Telegraphy.

In another column will be found an account of the working of the train telegraph on the Lehigh Valley.

The increase of limited trains which make very infrequent stops would seem to be one of the phases of modern railroading which is likely to show the desirableness of a system of communication of this kind. The New York Central fast train keeps its passengers out of communication with the rest of the world for about two and a half hours, while running between New York and Albany; and the Pennsylvania's limited occupies about three hours between Altoona and Harrisburg.

It might be argued that the restless American ought in justice to himself to take a vacation of a few hours from his exciting affairs once in a while, and that if a few fortunes were lost in Wall street by this means no lasting harm would result; nevertheless many general passenger agents will doubtless deem it to their interest to accomodate their patrons with every convenience possible, and to the list of attractions, such as dining cars, "vestibules," and electric lights, the train telegraph will have to be added by those who wish to keep just a notch or two ahead of their competitors. There is a mission too for this convenience, if it does not prove too costly, on ordinary passenger trains. People are willing to pay liberally for relief from anxiety, and the fair patron who has left in the car a parasol or a yard of ribbon which she has traveled ten miles to purchase would bless the railroad for a prompt means of telegraphing to the train, as fervently as would the broker on the limited who desired reports every ten minutes from his office.

The more that people use the telegraph and telephone the less care and forethought they take in all their affairs affected by this means of communication. At first the telegraph was used largely in the sense of a corrector of mistakes; for the sending of messages which had been forgotten when the mail started. But gradually intentional forgetting, so to speak, was induced by the new facilities, so that now, with cheap rates, very often no pains at all are taken to send by mail. This engenders habits of impatience, for if half or two-thirds of one's questions are answered or wants supplied without delay the desire for equal convenience extends to all wants. This is a reason why the train telegraph now has a field which it would not have had twenty-five years ago. — *From N. Y. Railroad Gazette.*

A New Form of Electricity.

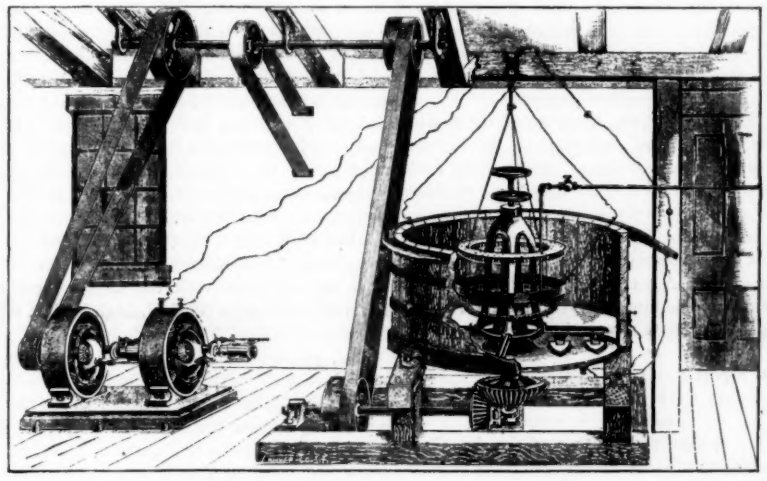
M. le Dr. Luce has made a very singular discovery—nothing less than "a new form" of electricity. This discovery was made by the learned doctor some five years ago, and has only now been communicated to the world through the medium of a brief letter in the columns of the *Bulletin de la Societe International des Electriciens.* From this letter we may quote the principal passages (translating *verbatim et literatim*) which summarize the discovery: "(1.) In a conducting medium the formula of propagation is $I=I_1-KD$; K being the coefficient of absorption of the medium, I the force at the distance D, and I_1 the initial force. (2.) It follows the contour of a wire, but has a great tendency to propagate itself in a right line. (3.) Its velocity is some meters per second. (4.) Its conductors and its insulators differ notably from those of ordinary electricity; I have called it the *forme nerveique* because its properties upon the whole closely resemble those of nervous propagation, if indeed they are not identical. (5.) It can be developed by motion, heat, magnetism, or voltaic electricity. (6.) The most practical method of evidencing its existence is the sensation which it produces in the hand, or the variation of temperature which it causes in a thermometer held in the hand. (7.) I have employed this agent in the treatment of all forms of disease and for five years it has enabled me to avoid the use of medicaments amongst my numerous patients." On reading these closing lines some subtle association of ideas brings irresistibly before us the peaceful images of rural life, and we seem with startling clearness to hear the sound of the duck pond and the poultry yard.

The Electric Trumpet.

Mr. Harry B. Cox, of Cincinnati, has created considerable excitement in the neighborhood of Fernback of late with an instrument, which is nothing more than a large tin horn with a crooked mouth piece. He has worked for several months to perfect the instrument, trying all sorts of electrical appliances to accomplish the results wished for, but finally discovered that the simplest device was the best.

The invention is the outgrowth of his discovery of the great distance an echoed or reverberated sound would carry, and the discovery that speaking trumpets, if made to give the same fundamental note would vibrate and produce the phenomenon known in acoustics as "sympathy." With this trumpet, conversation in an ordinary tone of voice was carried on between parties four and one-quarter miles apart. From the laboratory the spectators, standing about two feet away from the bell part of the trumpet and quietly listening, distinctly heard a locomotive whistle at Sedamsville, and at each surrounding station until it reached Fernbank.

Then the rumbling noise of the wheels of the train, as it passed over the track leaving Fernbank, grew less and less, and when blowing for road crossings and stations the whistle was plainly heard until the train arrived at Lawrenceburg, Ind., making a total range of twenty-six miles in which those present at the laboratory could follow the sound of that train. The railroad time-table was used to designate the stoppages, and the train, on arriving at Lawrenceburg, was one minute and forty seconds ahead of the time on the schedule.



ELECTRICITY APPLIED TO THE TREATMENT OF ORE.

People sitting at their windows or on the porches of their houses a mile away, conversing in an ordinary tone, could be distinctly heard, and in a couple of instances, in order to verify the accuracy of the test, they were told the nature of their conversation, and admitted that such had taken place. Yet it was a difficult matter to make them believe that several persons were edified by their remarks by means of a tin horn a mile away.

About dusk another evening, Mr. Cox and his brother, who is an Episcopal clergyman having charge of the city missions, made several amusing tests with the horn.

They experimented upon an old darky, and completely frustrated the old fellow, who was walking up the road. Using the bell end of the horn, they began talking to the colored man as he walked along.

The peculiarity of sound transmitted by the trumpet is, that to the person hearing it, it appears to come from some one near him, and not from a distance. The old darky hearing the voice was at first annoyed, then puzzled, and finally so badly frightened that he started up the road on the dead run, no doubt attributing his adventure to some supernatural agency.

Another more satisfactory test was made. Mr. Cox, taking a skiff at the river, rowed down stream a couple of miles, and landing ascended to the Kentucky hills. In the meantime another gentleman left Fernbank and going a little to the northeast, went out between two and three miles to the hill-tops back of that place. Each one carried a trumpet. Mr. Cox asked first if the other gentleman was ready, and an immediate response was had and conversation was kept up for some time, each one talking in his ordinary and natural tone of voice.

Tests were made on the river, and they proved to be more distinct on the water than upon land. A. B.

OUR KANSAS CITY LETTER.

(From a Special Correspondent of the ELECTRICAL REVIEW.)

The Beloit, Kas., Electric Light and Telephone Company has been granted the exclusive franchise for supplying Beloit with electric light, telephone communication, and electricity for power for the period of fifteen years. The electric light system is to be in operation by Jan. 1, 1888, and the telephone system within a year.

The Brush Electric Light Company has submitted a proposition to the council of Topeka for the lighting of the city. The company will at its own expense erect seven towers, not less than 150 feet high, upon each of which, and an additional one already erected and owned by the city, will be placed four Brush arc lights of 2,000 candle power each, and keep them burning all night for every night in the year for a period of five years for $9,000 a year. The company also offers to light the city by means of masts at the corners of streets, and will furnish thirty-two lights of that kind for $8,000 a year.

Mr. David Mason, representing the Sprague Electric Motor Company of New York, arrived in St. Joseph, Mo., last week, and at once commenced putting the apparatus in place for operating the electric motor railway. The Sprague Motor Company will make every endeavor to have the line operate successfully from the outset, as it is the only line of the kind using the Sprague in operation in the west.

The Pacific Mutual Telegraph Company officials have decided to construct a line from Omaha to Sioux City, giving Kansas City direct connection with that point. "Nor is this all the company has in view," said one of the officials of the company; "we are going to begin the construction of the Denver line at once. Every inch of the right of way in Kansas has been condemned and we are only waiting for the material."

The Pacific Mutual people do not anticipate an easy task in constructing the Denver line. It is generally understood that the condemned right of way lies along the railway lines, and to this the Western Union lays sole claim on the strength of contracts entered into with the railway officials. So a war of telegraph companies is on the tapis. "Yes," said another official, "I think the Western Union will contest every inch of ground, and will cut wires wherever they are put up. But on the other hand I think the Pacific Mutual has a handful of its own devices, and will get to Denver or bust."

"We are completing our arrangements and hurrying through as rapidly as possible," said Mr. E. L. Martin, president of the company. "Just when we will perfect our plans, I am unable to state, as new complications may arise which will delay us. We expect, however, to have our arrangements completed very soon. The line would have been built one year ago had we had satisfactory Eastern connections, and now that we are in possession of the latter it is the intention of the company to construct Western lines. The talk about the preparations for building the line has already had the effect of materially reducing telegraphic rates between the two points. The first cut was from 75 to 60 cents per 100 words, and now a rate of 50 cents has been established. From this it will be seen that the mere talk of our building a line has had a salutary effect in bringing down rates."

The Belleville, Ill., Electric Light Company has been incorporated. Directors, C. Perry, S. C Crummer, G. W. Stevens, F. M. Noble, E. A. Legon. Capital stock, $25,000.

The Wagner Fisher Electric Light and Power Company of Jefferson City, Mo., will increase its capital stock from $18,000 to $25,000.

The poles for the Kingman, Kansas, electric lights have been erected. The building for the dynamo, in Rock Island addition on the south side, is completed. The wire and machinery are expected daily, and it will only be the work of a few days to place the machinery in position, and string the wire when they arrive.

Brick work is now progressing at a lively rate upon the electric light building. A large number of subscribers have already been secured for house lighting, and many more will take it when once the very superior means is seen in operation. Wherever the incandescent has been placed in operation it has rapidly superseded gas, as it is clearer and steadier, is cheaper and for simplicity of operation is far beyond it. G. M.

KANSAS CITY, Mo., July 30.

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It would greatly assist in making domestic electric lighting more of a success, if a convenient and practical motor of small size was perfected for such use. It is out of the question to employ an engineer for every house, and the care displayed by servants is noticeable especially for its absence. There are on the market petroleum, steam and hot air engines, some of which, in the matter of constant speed, leave little to be desired. Purchasers have little to guide them in their selection, and they cannot afford the expense of elaborate tests. If these motors could be publicly tested, and the merits and demerits of each published, there would be a basis for guidance in purchasing and in improving the existing machines.

Electric light men have a pleased look of late. Why? Carbons.

The alert inventor has patented an electric smelling bottle. Its success will probably depend on how the public will take to the smell of electricity. There are some experienced masculine noses of auburn tint that can make the electric current quail every time.

"Distribution" seems to be quite a disturbing element in our Board of Electrical Control. Mayor Hewitt is of the opinion that before the electric wires are buried there should be some means invented by which they can be resurrected for general use. Mayor Hewitt is level-headed on this point.

Immediately following the fire at the Paris Opera House, a commission was appointed to consider means of preventing fires in theaters and public halls. They reported as follows:

"To prevent fire, remove the cause—gas. Displace gas everywhere, for whatever purpose it may be used. Install the electric light."

We are informed that the topic at the next meeting of the Electric Club, New York, will be "Storage Batteries," presented in an address by the able young scientist, Dr. Louis Duncan, of Johns Hopkins University. Dr. Duncan was for several years an officer in the United States Navy, and in electrical matters stands as high as any member of that department, which is noted for its many bright men. The club will undoubtedly be privileged to hear a very interesting and instructive address.

Herbert H. Eustis, treasurer of the Boston Electric Club and electrician of the Eastern Electric Cable Company, was a New York visitor this week. Club matters at the Hub are assuming very satisfactory shape, he reports. Mr. Eustis is a member of the wire gauge committee of the National Electric Light Association, and his scientific training made him a very valuable aid in the intricate work the committee was requested to undertake for the association. An elaborate report will be presented to the association next week.

The thirty-sixth meeting of the American Association for the Advancement of Science will be held at Columbia College, New York, from Wednesday morning, August 10, until Tuesday evening, August 16. Hotel headquarters will be at the Buckingham Hotel, Fifth Avenue and Fiftieth street, one block from the college. The president of the association is Mr. S. P. Langley, of Washington; the general secretary, Mr. W. H. Pettee, of Ann Arbor; and the permanent secretary, Mr. F. W. Putnam, of Salem, Mass. The work of this association in the past has been of vast importance and value, and the New York meeting promises to be unusually successful and interesting.

The Chicago Open Board of Trade has had its pocket picked—no, not exactly that, but it has lost its ticker. For a long time it has been known that bucket shops had in some mysterious manner clandestinely obtained the quotations. Everything seemed to have been done to discover the leak, without success up to the last resort—and now the open board is without the instantaneous reports it has heretofore received. Whether this will have the desired effect, and cut off the interlopers and illegitimate "transacters," or only breed bad blood between the two principals, remain to be seen.

This, however, will probably prove to be the truth, when found—that some innocent party's wire has been surreptitiously tapped, and is daily giving away quotations. This game was played successfully underneath the old board of trade, and the perpetrator only discovered years afterward. In one of the school books of half a century ago a motto was paraded quite prominently, as an encouragement to the scholar:

"What man has done man can do." Modernized by putting the adjective *line* before man in each case it will fill the present instance admirably.

ATTEND THE ELECTRIC LIGHT CONVENTION.

This is our last opportunity to urge our readers who are at all interested in electric lighting and electric power to attend the meeting of the National Electric Light Association at the Parker House, Boston, August 9, 10 and 11; and we desire to make the plea as emphatic as we can. This association is largely the center of the latest work in electrical matters, and all who fail to attend the Boston meeting will miss an opportunity for acquiring information of much value, that can be obtained in no other way. All who expect to keep up with electrical progress should attend.

LATEST IMPROVEMENT IN TRAIN TELEGRAPHY.

The electricians and superintendent of the Consolidated Railway Telegraph Company, Messrs. Edison, Phelps, and Dingle, have perfected their induction system of railway train telegraphy, having concluded that a separate pole line running near the track at all points would give the best results. A pole line is especially desirable on a new road, for it can be duplexed and used for ordinary business from office to office, thus in most cases providing for the whole business of the company and the towns on its line by a single wire. The metallic roof of a car and the truss rods on the under side thereof have been connected with each other and successfully used as the induction coil, so that it seems quite likely that the convolusions of wire can be dispensed with. All unsightly incumbrances in the car being thus unnecessary, the apparatus can be placed in a drawing room car or coach as well as in a baggage car or elsewhere. The operators on the Lehigh Valley now ride in the drawing room cars, the instruments being connected by a flexible cord with the baggage car. From the experience on the Lehigh Valley, it is apparent that an important mission of this device, perhaps the most important, is the serving of the passengers on the train, and it is clear that the more convenient it is for the people to patronize the line the more popular it will be. A neat office (which, however, consists of nothing more than a board about 13 inches by 15 inches in the operator's lap) in the corner of a parlor car, therefore, is likely to be much more successful than one among the oyster-tubs and coat-tearing trunks of the baggage car. The company now use a telephone receiver at both ends, the vibrator of the sending instrument sending the currents so that the buzzing, which sounds like that of a very shrill bee, is exactly reproduced in dots and dashes in the telephone. To read these dots and dashes is like reading Morse characters made by a steam whistle, which to most operators is not so pleasant as the familiar sounder; but the train operators find no difficulty in it, nor are they disturbed by the noise of the train, even with the windows open.

It is a popular mistake to suppose that because an invention is clever and original a patent for it must on that account be a valuable property. The value of a patent depends more upon the commercial ability and push with which it is handled than upon the intrinsic merit of the idea. As illustrations of this fact, many patents can be pointed out which are selling freely, and making large fortunes for their owners, while others of greater intrinsic value remain utterly unprofitable from unbusinesslike treatment. An inventor commonly has no knowledge of the usages current in business circles, nor has he access to financial quarters in which purchasers for patents can be found; he is ignorant of the forms required in approaching manufacturers or capitalists, if he happens to be acquainted with any, and frequently defeats his ends by the exaggerated importance and value he puts upon his invention.

OUR CHICAGO LETTER.

(From a special correspondent of the ELECTRICAL REVIEW.)

The Buffalo *Express* intimates that the "dull thud," the "sharp report," and the "loud splash," as descriptive of the death of the dear little doggies, have had their day, and gone. Hereafter this quadrupedal nuisance will walk into a metal-lined box, bathe his feet in an inch or so of water, wonder what they will do next, and before he makes up his mind where the laugh comes in, the operator will close the key and make a tolerably long dash, and the corpse will be ready for the bow wow coroner, with its verdict, intelligent as ever:

"Died from a lick o' tricity."

Elgin is in mourning. Will Hubbard, who has gradually but constantly grown thinner and taller and slimmer with the multifarious duties as manager of the Elgin Telephone Exchange for six years past, has succumbed, and retired from the business.

The writer knows what it was to build an exchange at Elgin, and can guess what it has been to maintain it. The West is full of electricians who know "lots" more about the telephone business than any manager, and they can invent more appliances to make life uncomfortable to that individual, than they themselves know. Hubbard knows this.

Then again, Will has an outside telephone business of his own, and, while this is not an electrical invention, it has the property just the same of making itself heard at a distance—limited.

Mr. H. will continue to run the Elgin acoustic telephone manufacture, and a general electrical business in connection therewith.

The telephone people are having a picnic about Minneapolis, St. Paul, and the rest of the little reserve in that neck of timber.

Ever so long ago R. H. Hankinson (in those days he was Dick) John Watson, F. B. Jilson and Morris Towne, held a franchise from the Bell Company for eight years. Then these cold-blooded fellows sold out to the Erie Company for the pitiful sum of $300,000. A couple of months ago the contract expired, and the Erie people now object to making the new contract at a cost of 30 per cent. of earnings for the balance of the time.

And all the while the tin-voiced girlie at the exchange pipes "hello," and the subscriber—well, he says it either end forward, as the humor strikes him, and growls at or cajoles the damsel, all in the same tone of voice. But he pays his bill or the inspector moves the instrument. He has no sympathy with the Bell or the Erie, however, and don't care who whips.

Down in Montgomery, Ala., the other day, the Governor and his secretary were riding in a carriage along Dexter avenue, when one of the guy wires, according to a correspondent, fell, and Governor Seay says his horse stumbled, apparently, which was unusual for the animal. The animal fell, and expired, killed by electrical current. The general manager of the railway undertook to get the wire from under the beast, but there was a certain unpleasantness connected with the act, and he gave it up. Then a very knowing little dog, who, if he could have used a card, would probably have had it printed something like this, "Don Carlo, Electrical and Mechanical Engineer," came bobbing around, nosed his way into the crowd, and sniffed at the wire. The horse and the puppy lie both in one grave, like Villikins and his Dinah.

There have been but few changes in the orders of the Board of Admiralty. Heretofore there has been a warning bell rung previous to opening the bridges. This gave a certain latitude to the bridge men, and often delayed vessels. Alderman Clarke has suggested, and the Board of Admiralty, through Chief of Police Ebersold, has ordered that this be stopped. Hereafter the bell will ring, and the bridge will open, as they used to say in the army, "in one time and two motions."

Dead wires are the cause of a large number of all the accidents occasioned by electricity. For instance: A wire of the duplex variety, which was once the property of a now defunct concern, the Chicago District Messenger Company, became very slack, and some electrical engineer wound up the slack round an electric light wire A second electrical engineer managed to get the dead wire on terms of intimacy with a telephone wire, which, of course, was grounded.

That was the trap. By and by, when no one was looking, along came another ground, and the next thing known in the chain of circumstances was a fire in the telephone company's cable house, and the loss of a hundred or two wires.

All this brings up an idea for telephone people to consider. One such wire would probably burn off, and if the insulation were not of an inflammable character, would the entire gang of wires be as liable to burn—would the tower be as dangerous to the property beneath? As it now stands, there are few, if any, of these towers where paraffined wires are not ready to hand to spread one of this sort of conflagrations; and if there is any one thing that is better than spirits of turpentine or powdered resin for that purpose it is paraffined wire.

The Electrical Supply Company here have accepted the agency for the Cleveland Standard Carbons. A large stock will be carried, so that orders of any size will be promptly filled.

Dr. W. C. Dunn, who took much interest in all developments of electricity, and was formerly the principal owner of the scheme by which a fire escape was made to ring an alarm bell on each floor of a hotel or dwelling, and was about to become interested in accumulator batteries and lighting, was found dead in his bed on Wednesday morning. An overdose of chloroform caused his death.

Recent licenses of incorporation include the Chicago Electrical Development Company, with $100,000 capital stock; F. S. Terry, F. W. Parker, and H. B. Bryant, incorporators. To manufacture and deal in electrical goods.

The Chicago Electrical Medicine Company, capital stock $10,000. To manufacture all kinds of medicine and medical preparations. H. E. Haas, F. C. Newell, H. B. B. Wickershaw

The Union Passenger Railway Company, of Chicago, capital stock $1,000,000. J. C. Page, V. P. Sherman, F. F. Douglass, incorporators. To build electric or other railway in Cook county.

The Dental Electric Vibrator Company, of Chicago, $100,000 capital stock. To manufacture the electrical vibrator. What quantities of agony these people anticipate, while playing with and plugging sensitive teeth, while the sufferer has his pent up feelings held back by a dam—a rubber dam—whose only vengeance is found in disputing the bill of the carpenter, after the job is finished.

Chicago has advertised for an arc light plant to light up the inland marine.

There are to-day in Chicago representatives of about nine different systems of arc lighting. Each is best—any one is better than all the rest.

Up to Friday night all but one of these had secured the contract, although the bids were not to be opened by the Commissioner of Public Works until Saturday.

Whom the unfortunate company is represented by is not known. Nor is the name of the company attainable; but the interrogation marks at every agency are thicker than mosquitoes in New Jersey, while around Professor Barrett's desk they have fallen from the ends of useless questions, until the janitor who sweeps the office has threatened to make a requisition for a scoop shovel.

In other words, there never was more interest manifested, nor were more questions asked, relative to a hundred light plant, perhaps, than in this case; for it is so near home. "Why," said one agent, "I've run against all these other fellows, going and coming from the City Hall, so often that I'm all black and blue."

Competition is the life of trade; but opposition seems to be the backbone of the electric light business.

The Western Electric Company report recent sales as follows: A twenty-light plant for the Eastern Illinois Hospital for the Insane, to light up the grounds, the larger halls, etc.; a sixty-light plant to the gas company at Stevens Point, Wisconsin; an addition of thirty lights for the Kankakee Electric Light Company.

CHICAGO, August 1, 1887.

Early Electric Motors.

To the Editor of Electrical Review:

As I was coming over on the Fall River boat the other day I had the pleasure of meeting Dr. Louis C. d'Homerque, of the Department of Health, Brooklyn, who entertained me with an account of a trip that he made in 1852–53 from New York to West Camp, up the North River, in a 12 foot boat driven by an electric motor, the current for which was furnished (as I should judge from his description) by a battery of Bunsen cells. The motor used was the invention of Mr. Larmanjat, and was capable, even at that time, of a reversal of motion.

Subsequently, a larger motor of this same style was built, but so little was known then of the laws governing the construction of electric motors that all that could be got out of it was a half revolution, when it stopped. On being turned back again by hand to the starting point, and the current turned on, this same half revolution was made.

It would seem strange that with the former successful motor to fall back upon, that this difficulty should have proved insurmountable, as it seems to have done.

The doctor said that he thought that those original motors were still in existence.

Boston, August 1st. H. H. E.

Incandescent Lamp Manufacture.

BY J. SWINBURNE.

TESTING.

The first thing to test is the vacuum. The usual way is to pass the spark from an induction coil through. If one terminal of a Ruhmkorff coil, giving about a half-inch spark, is connected to the terminal of the lamp, and the other is led to a wire tied round the bulb, and the lamp gradually exhausted, the discharge is purple or lilac at first, with pinkish lights round the carbon. As the vacuum gets better, the discharge becomes bluer; and if the bulb is made of German glass, it gradually changes to bright green. The green is distributed through the bulb at first; but as the vacuum gets better, it is confined to the internal surface of the glass. It then appears only in patches on the glass, and finally it disappears altogether. It is difficult to get it to disappear altogether. If the bulb is made of English or lead glass, the discharge is never of the brilliant apple-green seen in the case of German glass; it is of a bluish color till it disappears.

The primary coil need not be supplied by a primary battery, as the cells are very troublesome. It is best, therefore, to connect it with a dynamo and resistance, or to work it from a secondary battery. If it is put in circuit with a dynamo with resistance in series to reduce the electromotive force, a lamp should be put in shunt to the primary coil and contact breaker, otherwise the sparking is troublesome, and soon destroys the contacts. One terminal of the secondary is led to a plate, and the other to a loop, about an inch off, so that when the lamp is taken by the tip, and held in the loop, the terminals touch the plate. In testing lamps with very thin or weak carbons it is best to take the lamp in the hand and touch one terminal of the coil only, as, if the lamp has a powerful discharge passed through it, the carbon is often broken. Sometimes the carbon remains some minutes stuck against the glass after the discharge. Lamps will also frequently glow in the dark after the discharge.

A large number of lamps can be tested for vacuum very quickly. Those which do not show either a bright apple-green on the glass if German, or no discharge at all, are rejected. Any rejected lamps are examined; if there are any cracked at the sealing in they are sent back to the glass blowers' room to be repaired if possible. To repair such a lamp, the nose is held for a moment in the blowpipe flame, which cracks it. The lamp is left till the vacuum is destroyed by the slow leakage thus produced. The nose is then knocked off, and a new exhausting stem is sealed on. It requires some practice to do this neatly, but with care a lamp may be repaired so well that no one could tell it had been exhausted twice. The cracked end is then very slowly and carefully heated and worked till the crack is gone. The lamp is then sent to the pump room in the usual course. If the lamp is merely badly exhausted, a new exhausting tube is sealed on, and the lamp pumped again.

The current opinion is that the vacuum in a fairly well exhausted lamp is about one in a million, and that the Ruhmkorff coil is an infallible means of testing the vacuum.

The writer has come to the conclusion that this is not the case, and that the vacuum generally obtained is not more than about one in 20,000. The whole question demands further experiment, as the results obtained so far are conflicting, and there are not enough data to draw conclusions with certainty. In the first place, mercury vapor must have some tension. It seems to have been generally assumed by those who have worked at high vacua that it has no tension. Regnault found the vapor tension of mercury at 20°C.—which may be taken as the average temperature in a pump room—to be .0372 mm.; this would give one in 20,000 as the maximum vacuum obtainable by any mercury pump. Apart from Regnault's determination, the mercury must have an appreciable vapor tension, for it evaporates perceptibly at ordinary temperatures. If a piece of gold leaf is held near mercury it is soon amalgamated. It seems, therefore, probable that the mercury pump ceases to take out air when the pressure is about equal to that of the mercury vapor itself. This would show why a Geissler pump goes on taking air out after a Sprengel stops, as the mercury in a Sprengel, being violently broken up, would give off vapor more easily. The action of the pump would of itself lead one to suppose that some such action takes place. If a Geissler pump, with a bulb the same size as, say, one lamp, and the phosphoric and other tubes were set to exhaust the lamp, beginning with a pressure of 10 mm of mercury, it would reach a vacuum of one in a million in fourteen strokes. if the glass gave off no air; the glass, of course, does give off air; so the pump takes considerably longer. But if the pump really brought the vacuum up to one in a million, it is not likely that the gas would be given off gradually, so that the vacuum soon rose to one in 200,000 or 300,000, and then rose to one in a million very slowly, never getting much better. If the Geissler is worked till it shows a vacuum that would generally be called one in a million, and then left for some hours, the vacuum will apparently have fallen to about what would be called one in 100,000. Even if the lamp be heated very strongly, and be pumped for several days, it will show a so-called vacuum of only one in 20,000 or so, after standing, though it showed one in a million at the last stroke of the pump. When a Geissler pump is worked till it shows a so-called vacuum of one in a million, it goes on for some time with only slight improvement of the vacuum. If the vacuum were really one in a million, or so, and the air delivered by the pump were approximately equal to the air coming off the glass, which is the accepted theory, the vacuum would immediately fall to one in 500,000, if the pump were allowed to miss a stroke. It does not do this, however; the apparent vacuum falls very slowly. This is easily explained on the mercury vapor theory, as the bulb of the pump would be nearly full of mercury vapor, a little air coming in to every stroke, so that the apparent vacuum would increase very slowly. If the pump is left for some hours, the air would diffuse into the pump bulb, and the mercury vapor would also find its way into the phosphoric tube and lamp. This would also explain why the apparent vacuum should fall off so much when the pump is allowed to rest for a day or so.

To return to the spark from the induction coil. It has been already mentioned that no spark will pass through the bulb of a good Geissler pump while the mercury is descending, until the end of the tube from the lamp is uncovered. It was known in the last century that pure mercury vapor does not carry any spark. A Torricellian vacuum was made, the mercury having been very thoroughly boiled in the tube. It was found that the spark from an induction coil did not pass. When a little air was admitted, however, the bright green light appeared at once. Mercury vapor, therefore, contrary to the statements generally made, will not pass a spark unless air is mixed with it. As already mentioned, mercury seems to sweep the air off the glass, so that the Geissler bulb contains pure mercury vapor when the mercury is descending, but the spark can pass immediately the end of the lamp tube is uncovered.

Another way of testing vacua, which is only applicable in experimental work, when the lamp is not wanted, is to open the bulb under mercury. It requires care to perform this operation properly. If a lamp is merely held with its nose under mercury, and if the nose is then broken with a pair of pliers, the mercury will leave a bubble of air about the size of a bean. Most of this has come in from the outside, as there is a film of air upon the outside of the lamp, and especially on the jaws of the pliers. If the nose be broken so as to make a very small hole, and if the jaws of the pliers or any such thing be held against the tip, bubbles of air will be seen to come into the lamp. The best way to prevent this source of error is to wet the lamp and pliers with water or oil. If a number of lamps which have broken terminals, or are wasters from some other cause than bad vacua, are taken and tested with the induction coil, and are then opened under mercury, it will be found that those which showed what would generally be considered the best vacua on the coil do not always show the least air when opened under mercury. The air bubble generally left when a lamp is opened under mercury would correspond to a vacuum of about one in 10,000 to one in 20,000; but sometimes the mercury fills the whole of the inside of the lamp, showing a perfect vacuum. It is probable that the air condenses against the glass, and that this test is of little or no value. Davy found that when the mercury was allowed to rise to the top of a barometer tube slowly it left a bubble, but when it was allowed to come up with a bump, the bubble did not appear and the air seemed to be flattened out against the glass.

Sometimes a lamp passes no spark, or shows bright green spots after it has been lying in the store for some time, but after running it will show a much lower vacuum on the coil. If left for some time the vacuum will appear to improve again. It seems as if the gas inside condensed on the glass, and was driven off by the heat when the lamp was run. The passage of sparks also seems to bring off gas from the glass. This effect may be best observed while exhausting a lamp. The vacuum of the lamp can also be apparently reduced by merely heating it.

Sometimes lamps, especially those for high electromotive force, or badly exhausted, show a blue light flickering about on one end of the carbon. There is a curious phenomenon in connection with this blue light. If a lamp which shows it is run still brighter the blue light generally gets worse and leaves the terminal, and spreads until the whole of the inside of the lamp becomes filled with bright blue light. If the lamp is overrun for some time, the blue light begins to flicker, and the flashes get fewer till there is only an occasional flicker visible. Finally it disappears altogether. It cannot be made to appear again.

If the lamps are run on the pumps, any that show blue lights during the testing should be rejected and sent back for re-exhausting; but if they are not run on the pumps, lamps for high electromotive force will occasionally show blue lights, which disappear at once and may be disregarded if the lamps show green phosphorescence on the induction coil.

The whole question of high vacua and the adhesion of air to the glass demands thorough investigation. Bunsen is of opinion that carbon dioxide is dissolved by the film of water on the surface of the glass, and that, though solution of carbon dioxide in water at ordinary pressures does not act on glass, still the capillary attraction exerts such enormous pressure that a sufficiently strong solution is made to act on the glass, forming carbonate of soda.

The writer hopes to be able to carry out some further experiments on high vacua within the year, and if they prove worth it, to publish any results that may throw light on the difficult question.—*London Electrician.*

Telephonic News

*** The wife of Mr. Henry B. Lytle, of Providence, died at his residence there on Monday last, after a very severe and protracted illness.

*** The Tropical American Telephone Company's office in Boston has declared a dividend of one per cent. Ten cents per share on all stock of record Aug. 1; payable Aug 14.

*** The monks of St. Bernard have brought the telephone into their service of mercy. The famous hospice is now in telephonic communication with the Cantine de Proz and the village of St. Pierre, as also with the Cantine de Fontinte and the village of St. Chemey on the Italian side.

*** For quarter ending June 30, the New England Telephone and Telegraph Company makes the following showing:

Gross receipts for three months ending June 30, 1887.....	$251,781.99
Expenses	178,587.72
Net Earnings	73,194.27

*** The Rocky Mountain Telephone Company intend to string a new copper wire between Butte, M. T., and Deer Lodge, which will undoubtedly improve the service between those points. Mr. C. F. Annett, of Salt Lake City, the general manager of the company, is now at Butte looking after telephone improvements.

*** The Philadelphia syndicate, which we mentioned several weeks ago as having entered into negotiations with the Chinese government for placing telephones, has obtained the exclusive right for fifty years. This will very likely prove a big thing for the members of the syndicate, if the Chinaman takes readily to the talking machine.

*** Articles of association have been filed by the Superior Telegraph and Telephone Company, of West Superior, Douglas county, Wis., with a capital stock of $3,000. The incorporators are E. E. Barton, P. E. Bradshaw, J. J. Atkinson, O. N. Murdock, C. J. Thomas and H. E. Ticknor. The object is the construction and maintenance of telegraph and telephone lines.

*** At a meeting of the directors of the New England Telephone and Telegraph Company, held last week, a dividend of seventy-five cents per share was declared, payable on Monday, August 15th, to stockholders of record at the close of business on Saturday, July 30th. The transfer books will be closed from August 1st to August 14th, both days included.

*** The other day at Newark, N. J., a young man coolly unhitched a horse which he found standing on the street, and stepping into the wagon drove off. The instinct of the animal led it to the livery stable from which it had been hired, and to the owner of which the thief had the assurance to offer the horse and buggy for sale. But the telephone was set at work, and the young man was led off by a tall man dressed in blue.

*** The possibility of making some device which shall register a message coming by telephone has long been discussed, but as yet nothing practicable has appeared. One inventor has suggested that some modification of the phonograph could be attached to the receiver, and would be ready at any time to repeat what came over the wire. As yet the phonograph will not record anything so delicate as the vibration of a telephone diaphragm, but with Messrs. Edison and Gilliland at work on it, some very valuable results may be expected.

*** The general offices of the N. Y. & N.J. Telephone Company will be moved in a few days from 397 Fulton street, Brooklyn, to 16 Smith street, where new and complete quarters have been secured. The operating room will be moved over about January 1, 1888 at which time the new multiple switch-boards with a capacity of 3,600 will be in place and all cabling to the new exchange completed. This company is erecting a building in Williamsburgh for use as the exchange at that point, having reached the conclusion that it was cheaper to own a building than pay rent.

*** Omaha, Neb., has a telephone exchange of 900 subscribers and about 202 miles of wire, most of which is in cables. There are eighteen prompt, obliging and efficient operators employed in the office, and General Manager Drake cannot be otherwise than proud of his service. The operating room is newly furnished, and contains all of the modern improvements and conveniences in the telephone line. The longest distance of line that has been easily spoken over through the Omaha office is from Beatrice to Columbus, a distance of just 200 miles. The clearness of the words over the wire is greatly due to the weather. If the air is heavy or damp conversation at times becomes a little difficult, but on a good clear day parties seventy miles apart can understand each other without repeating on an average three calls out of five.

*** The Committee of State Legislature, appointed by Speaker Husted at the last session, to take testimony during the summer, and submit to the next Legislature, if possible, some plan by which the charges of the telephone companies can be reduced, has commenced at Utica. The committee is composed of Messrs. Ainsworth, of Oswego, chairman; Hadley, of Franklin; Saxton, of Wayne; Dickie, of Richland, and Connover, of Westchester. Other sessions of the committee will follow at irregular intervals in Albany, Rochester, Syracuse, Buffalo, Auburn, Plattsburg, Saratoga, and in other cities or large towns where there is a telephone exchange. The intent of the special committee will be to ascertain just what royalty is paid the Bell Company, and how much stock of the local companies is owned by the Bell. Then it will draw up a bill, or recommend legislation to regulate the charges, and to regulate the Bell Company as well, if it is possible to get at it in any way. It is not expected by men well informed on the subject that the special committee's work will amount to a row of pins; but everybody knows they will have a good time and take lots of testimony.

*** At the last meeting of the Berlin Electrical Society, Prof. Karsten described his telephone siren. The instrument (says *Industries*) consists of a disk, to the face of which are fastened radially small steel bar magnets. This disk is revolved by clockwork, and the pole of an ordinary Bell telephone, with diaphragm removed, is presented to the rim of the disk. The rapid passage of magnet poles induces currents in the telephone, and a musical note is produced in a telephone receiver connected with the siren. If all the magnets present the same polarity outwards, the number of complete waves produced during one revolution of the disk equals the number of magnets; if, however, the magnets are placed with alternating polarity, the number of complete waves is half that of the magnets, but the waves are stronger. In this case the tone heard in the receiver is the lower octave of the tone in the former case. It is also possible to arrange other combinations; for instance, if the poles are placed in the succession N N S, N N S, &c., the tone heard is the fifth of the former. Prof. Karsten has found that this combination gives tones most readily distinguished by the human ear, and he recommends it where this apparatus is to be employed for the measurement of resistances by the use of a telephone instead of the galvanometer in bridge tests. He finds that the sound given by the siren is more easily distinguished from accidental noises, which often accompany the employment of the usual make and break arrangement. By combining the siren with an anemometer it is possible to tell the strength of the wind from the tone produced in the receiver.

Love and the Telephone.

Miss Mary Haley is, or rather was, an attractive employe of the Orange telephone central office, and James Heagan is the manager of the Long Branch office of the same company. Frequent communications over the wire aroused Heagan's curiosity, and at last he fell in love—with a voice. At the first opportunity he visited Orange and formed the acquaintance of Miss Haley. His interest deepened, and soon his visits became of weekly occurrence. Finally, about three months ago, the lady quietly slipped away, and, meeting her lover in New York, the pair were married. Mrs. Heagan resumed her desk in Orange, as if nothing had happened, and all went well until Tuesday of this week, when she packed up her worldly goods and joined her husband at Long Branch, leaving a wondering and amazed crowd of friends behind, all of whom, however, wish her happiness.

Optical Demonstration of the Action of the Telephone.

The following is an abstract of a paper in the *Electrotechnische Zeitschrift:* "The mechanical movement of the diaphragm of the telephone, if actuated by powerful currents, can be shown by the nodal lines formed by lycopodium dusted on its face; but if the current be generated by a microphone or by another telephone actuated by singing or speaking, not a trace of a Chladni's figure is produced. By affixing a small mirror, however, between the center and circumference of the diaphragm, and reflect therefrom a beam of light on to a distant scale or telescope, its motion can be detected; but for a lecture demonstration the best method for exhibiting this motion is to fasten a stretched wire to a projection on the center of the diaphragm, and fix a mirror longitudinally on the wire between a loop and node, by which means a movement of 18 inches or so can be given to the spot of light on the scale; the form of the vibration is, of course, not reproduced in this latter instance. If mirrors be fixed to both the actuating and receiving instruments, the beam, after reflection from both being thrown on a screen, as in Lissajou's method, the figures observed afford a most simple means of illustrating the deformation of the musical notes or vocalization which results from the action of the diaphragm itself. For the most accurate examination of the movement of the telephonic diaphragm the author has adopted König's method of dancing flames analyzed by a rotating mirror, and outline diagrams of the different forms of the vowel sounds as sent and received, revealed by this method, are given. The effect of the introduction of electrical resistance, capacity or self-induction in the circuit, as regards the alteration and interconfusion of the different vowels or consonants, is thereby clearly revealed, and is due not so much to reduction of the intensity of the sound as to the rounding off of the current waves. The permanent record of these flames could not be photographically produced with ordinary gas, but a certain degree of success followed the use of bisulphide of carbon vapor burning in nitrous oxide gas, as by this means the maxima or ridges of the flames were clearly developed, though the minima or furrows were somewhat indistinct. The author proposes the application of this method for testing dynamo machines, as by it can be seen the actual progress of the phase in the alternating current, or the impulse at the passage of the brush over each commutator plate in the continuous current. It could also be conveniently applied for chronographic measurements—*e. g.*, the velocity of projectiles in the gun tube; let the shot contain an iron bar, and the gun be surrounded by a series of coils which are in connection with a telephone and some source of electric current; then the time of the passage across the plane of each coil can be actually recorded on the photographic plate, the great advantage of this method lying in the fact that the gun tube need not be tampered with, and that one or two sets of coils would suffice for guns of any caliber."

Long-Distance Telephoning.

The first of the long-distance telephone lines was opened between New York and Philadelphia last January. Since then the business has increased so steadily that the work of extending the lines in different directions has been carried on more rapidly than was at first proposed, and almost every week some new town is reached. The most important addition of the last fortnight has been New Haven. Springfield will be reached within the next ten days. One of the officers of the American Telephone and Telegraph Company, which is engaged in this long-distance telephone business, said, in a recent interview: "The chief obstacles to the use of the telephone over long distances were the inductive influences from one wire to another, which prevent perfect service with single wires over our short city circuits, and was fatal to the work over long distances. Ever since 1876 experiments showed that while it was perfectly possible to telephone with ease between cities a thousand miles apart a great deal would have to be done before long-distance lines were practicable for commercial use. The improvements have been made not so much in the telephone or the receiver, which remained practically what they were as Bell left them, but in the wire and the methods of insulation. Upon long distances the trouble from induction is such that we are compelled to run our wires in a zigzag fashion from one pole to another, and not in parallel lines; we thus use a great deal more wire, but we escape some of the induction. In the next place, we use hard-drawn copper wire, instead of iron, and we use two wires where the ordinary telephone and telegraph system uses but one. By means of great care in keeping our wires in perfect condition, we are able to do what seemed impossible in the early days of the telephone—that is, give business men the convenience of talking between New York and cities within 500 miles of New York as easily as if they were within ten feet of each other. The first line was opened from New York to Philadelphia last January with fifty wires, constituting twenty-five circuits. Some of these circuits we have leased outright to business men and corporations; others we divide up among a number of firms, and the others we retain for transient business. In New York there are 130 offices in which there is direct communication by our wires with Philadelphia without resorting to the Metropolitan Telephone Service. This is far more satisfactory than when the city telephone lines are used. In Philadelphia there are forty places to which our wires run directly. These offices are fewer in Philadelphia because a large part of the business men prefer to use the instruments we have set up at the chief hotels rather than go to the expense of having special instruments in their offices. We charge $1 for a five minutes' talk between New York and Philadelphia; but the charge begins only when connection has been established between the two persons who wish to talk; if we cannot get this connection made there is no charge. Business men who are telegraphing back and forth every day know what an amount of news can be given by telephone in five minutes if the instrument works perfectly and there are no interruptions. I suppose that our business in single messages of this kind will average from 150 to 250 a day, with the tendency to increase steadily.

"Our New England lines now run through Stamford, Norwalk, Bridgeport, Birmingham, Ansonia, New Haven, Meriden, New Britain, Hartford, Essex, New London, and we connect with all points on the line of the Southern New England Telephone Company in Connecticut. Before the winter is over the lines will be open to Worcester and Boston. We have thirteen circuits running to New Haven. Our lines will be finished to Albany before winter, and to Washington before spring. We do not attach very much importance to the Washington line, owing to the fact that most of the business will be of a newspaper character, sent probably over leased wires. It is perfectly easy for any large firm to find out

whether it will pay them to lease a special wire or a share in such a wire; they have merely to compare our charge with the average amount of their telegraph bills to any point at which we have an office. We make arrangements for leasing the wire for an hour a day or two hours a day, at any time when a business man is most in need of such a convenience, or we give a man a wire for five minutes, or ten minutes, or twenty minutes every hour at a fixed price. Or, if a firm's business is very large, we sell them the privilege of sending a certain number of messages at a reduced rate. The saving in telegraph bills to railroad companies, for instance, must be enormous. The Pennsylvania Railroad Company leased one of our circuits at once and uses it constantly; the New York, New Haven and Hartford Railroad Company leased a wire between New York and New Haven this week."

In some of the announcements, of the extension of this long-distance telephone service, the newspapers have intimated that the loss of business to the telegraph companies owing to this competition would be tremendous. One of the officers of the Western Union Telegraph Company, who was asked concerning this by a reporter of the *Post*, said: "Of course the telephone may take the place of the telegraph in many instances, but the moment you get distances of more than 300 miles the expense of running double-wired circuits of copper is going to become enormous, and as the number of telephone messages which can be sent is insignificant as compared to the amount of business which can be done by telegraph, I do not see that we need fear any competition. While the operators are calling up different people at the two ends of a telephone wire between Chicago and New York, we could send half-a-dozen messages. It must also be remembered that every day increases the amount of work which we can get out of a wire. Since the introduction of the Wheatstone system of sending, the speed over the wire has increased from 20 words a minute to an average of 130. In this Wheatstone system we perforate a tape of paper, the number of perforations signifying different letters of the alphabet, and this perforated tape is passed under a steel point which closes the circuit every time it meets with a perforation on the paper. The amount of business which can be sent over the wire depends, therefore, solely upon the rapidity with which this tape can be passed through the sending apparatus, for we can keep any number of operators busy perforating. The first of these machines was introduced about five years ago. Now we use them to Chicago, to St. Louis, to New Orleans, and over these three important lines we send 3,000 messages a day, thanks to this invention. On long distances, where there is constant trouble from storms and other accidents, it is important to work the wire to its highest capacity when we have it in working order. We now use one wire for sending four messages at a time, that is to say, it is duplexed for the Wheatstone system and for the ordinary Morse system, thus keeping four people busy, two Wheatstone operators and two Morse in sending, and as many more in receiving. Another difficulty which all telephone companies trying to compete with us will meet with is the lack of any record in black and white. Stock brokers are not likely to trust to a telephone message which may be indistinct, when they can get it written out by telegraph."

.... The Empire and Bay State Telegraph Company, which is running a line from New York to Boston, is in trouble in Connecticut owing to the mismanagement or worse of the contractor, C. A. Jackson. He is said to have overdrawn about $20,000, but has failed to pay bills, and gangs of workmen have stopped work at Woodstock, New Haven, Somers, Warehouse Point, Newington, etc. Those at Warehouse Point had received no money for two months, and were put out of their boarding house. Many farmers are also anxious about payment for poles furnished. The company, it is reported, has abundant funds, but very naturally desires to get a settlement with Jackson.

Our Own Electrical Commission.

HOW THE NEW YORK WIRES GO UNDER GROUND MADE INTERESTING TO THE PUBLIC.

The meetings of the New York Board of Electrical Control, in the Mayor's office, are breezy and animated—to some extent typical of electrical matters generally, in that they are full of interest and life. The meeting last Wednesday was attended by the three Commissioners and Mayor Hewitt, who is a member under the new law. The principal subject of dispute was the question of granting permission to the Construction Company to extend its work on Broadway, from Fourteenth street to Thirty-fourth street. Engineer Kearny reported that Broadway was to be torn up on both sides, one side for electric light wires and the other for telegraph and telephone wires, and favored granting the permission desired. Mayor Hewitt wanted to know what system of local distribution was to be used, or whether any system had been adopted that would dispense with the use of poles and overhead wires. "The object of this Commission," he said, "is to get the wires under ground, but the problem of local distribution without poles or overhead wires is equally important, otherwise we will be simply substituting one set of poles and wires for another, and I for one am opposed to granting any permit to tear up the streets any further until that question is settled."

Engineer Beckwith, of the Construction Company, said that his company had at least fifty systems of local distribution under advisement, but had not yet decided which it would use. Being pressed further by the Mayor, he acknowledged that some of those systems contemplated the use of poles and overhead wires "in places."

"Then what is the use of building a subway if we are not to get rid of the poles and overhead wires?" asked the Mayor, and a general discussion of the subject followed, in which Commissioners Hess and Gibbens also took part. These gentlemen, as well as the engineers, assured Mr. Hewitt that some satisfactory plan would be adopted and that it would be "all right," but he refused to be satisfied with these assurances and insisted upon knowing something definite about the system to be employed before voting to tear up the streets.

"There is no possible doubt that the work of local distribution can be done. I know there is a way," said Commissioner Gibbens.

"Are you an electrical expert, that you are so positive about this?" asked the Mayor, sharply.

"No, I am not," said Mr. Gibbens, with decision, "but I have given this subject some attention, and I know of a way. I am in favor, however, of giving the Construction Company the largest possible license in deciding what system shall be adopted consistent with the city's interests. The company has a great many systems under consideration, but if it is compelled to decide now upon any particular one it will be compelled to buy the patent at the owner's price."

"I for one am exceedingly ignorant upon this subject," said the Mayor, "and I should like to be informed. In the first place I should like to know whether the Construction Company is subject to this commission, or whether the company owns the commission. If the latter, then we had better let them decide what they want to do and then submit the points to us for our concurrence."

Commissioner Gibbens answered that if the company did not select a satisfactory system it could be compelled to do so by the Board, and explained that he thought it would be feasible to distribute the electricity from the man-holes as water and gas are distributed. Then he moved the adoption of a resolution directing the Construction Company to go ahead with the work.

"And I move as an amendment," said the Mayor, "that the work shall not be undertaken until the company has submitted to this Board a system of local distribution which will not involve the use of poles and overhead wires."

Mr. Cohen endeavored to convince the Mayor that the matter would be all right, and that the poles and wires would be removed.

"Then, in that case, there can be no objection to my amendment," suggested the Mayor.

"It is not possible," suggested Commissioner Hess, "that these people would invest their money in this burying of the wires without having some plan of distribution."

"The responsibility is with us and not with them," answered the Mayor, "and we cannot shift it to them."

"But we may have to permit some wires overhead," answered Mr. Gibbens.

"The whole object is to get rid of wires overhead," said the Mayor, "and I will not vote to extend the conduit until it is clearly settled that we are not to have poles and wires overhead."

Mr. GIBBENS—I don't understand the law the way you do. You had a resolution passed the other day that got a lot of honest men into trouble who were repairing wires without a written permit.

Mayor HEWITT—You voted for it, did you not?

Mr. GIBBENS—Yes.

Mayor HEWITT—Then you should not criticise my action.

Mr. GIBBENS—I have had great difficulty in getting resolutions passed here.

Mayor HEWITT—Indeed! I had not observed that, except in one instance (referring to Mr. Gibbens' failure to secure the appointment of ex-Senator Cornell as Chief Inspector).

Mr. GIBBENS—You were in favor of granting the permit to the Western Union.

Mayor HEWITT—Did you not vote for that, too? (Mr. Gibbens acknowledged that he did.) Then why do you criticise what I do when you approve of it?

The Mayor's amendment to Mr. Gibbens' resolution was then voted down, Mr. Hewitt alone voting "aye," and the resolution granting permission to the Construction Company to extend its work on Broadway was adopted, Commissioners Hess, Moss and Gibbens voting in the affirmative. A similar permit for the opening of Broad street was also discussed, but no action was taken pending the receipt of more definite information concerning it.

Park Benjamin was called as an electrical expert, and said that in his opinion the rules of the Board now in force were all right. The Mayor said that the vital point was, were the rules sufficient, or could any new rules be framed to make the wires more safe; but Mr. Benjamin had not considered that point, but thought of no improvement in the rule.

Mr. Gibbens then moved that the secretary be instructed to send a copy of the Mayor's resolution about repairs and a copy of the rules to each of the existing electrical companies, as it was necessary that they should have a written permit to show in making repairs to overhead wires, and he took occasion to remind the Mayor that he (the Mayor) had said he would disregard the law, if necessary, for the safety of life and property, and pictured the direful effects that would follow in case of the Mayor's arrest for such a cause. "You would certainly go up," he finally remarked.

"Well," answered Mr. Hewitt, "I have been going up all my life and I am not as high yet as I would like to be."

"President?" queried some one in a whisper.

"More power to your elbow!" replied Mr. Gibbens.

The question of granting the applications for permission to extend wires overhead pending the building of the subway, was made a special order for a meeting to be held to-morrow noon. Applications from T. G. Ellsworth and G. H. Stout, for appointment as Chief Inspector, were received through the Mayor, and ordered on file. J. D. Beere then handed in a petition and prospectus of the Beere-Grant conduit system. Nothing was said about the proposed appointment of ex-Senator Charles G. Cornell as Chief Inspector.

TELEGRAPHIC

.... There are a number of rumors floating around about the sale of the B. and O. Telegraph Company to the Brotherhood of Telegraphers of the United States. It is not a very probable thing. The committee said to be at the head of the move on the part of the operators is composed of Tom O'Reilly, Edward Quick, John B. Taltavall and Edward Buckley.

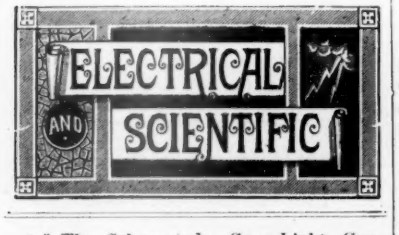
.... The Chamber of Commerce, San Francisco, has adopted a resolution to petition Congress to offer inducements so that capital may be attracted to the construction of a cable between that city and the Hawaiian Islands, the South Pacific Island and Australia, claiming that the political and commercial relations between these countries justify such action.

.... Mr. Raikes, the Postmaster General, stated in the House of Commons recently that the number of telegrams sent for some weeks past exceeded a million per week, whereas under the shilling system only 700,000 to 800,000 were sent in the same space of time. It was still, he said, impossible to say whether the sixpenny system paid its way or not, since the increased expenditure had been considerable. During the next year the revenue, it was hoped, would be largely increased, while the expenditure would be reduced. The new system was yet in its infancy, and the outlook for the future appeared to him to be hopeful.

.... Robert Gurt and M. Casey, the Western Union telegraph operators who have had charge of the instruments at the Grand Hotel, Indianapolis, have quit work on account of an order promulgated by Proprietor Pfingst, excluding them from the dining-room, and requiring them to take their meals with the servants of the house. They objected to this, believing that they were entitled to as much consideration as the clerks and bartenders, who have a table in the dining-room, and a strike was inaugurated. An operator from Columbus, who was willing to work twelve hours a day and be governed by the rules of the house, was secured to take the place of the strikers.

.... The large number of losses of both life and property by lightning every year suggests attention to the fact that no accurate and approximately complete statistics of deaths and damage by lightning have ever been published. Mr. H. F. Kretzer, of St. Louis, is at work on such a compilation, and when the record for 1887 is completed he proposes to publish what he thinks will be the most complete record ever made. Mr. Kretzer has just received a report from the State Board of Health of Massachusetts in verification of his statistics. They report seven deaths from lightning during 1886. Lightning damages are not as heavy in the East as they are in the Middle and Western States.

.... In considering the principal lines of ocean telegraph, a contributor in the Philadelphia *Call* enumerates them and says: "Suppose, now, a California merchant wants to telegraph a correspondent in New Zealand. That isn't so far, geographically speaking, but from a telegraphic point of view it is far in the distance. The California man would send his message something like this: He would start it across the continent, where it would take a journey under water, be flashed through Europe, again under water in the Mediterranean sea, through the Suez canal, across India, under the Bay of Bengal, the Java sea, piece of the Indian ocean, and finally to the operator at Palmerston, Australia. He would start it across that continental island to Sydney, where it would take another bath, this time in the Pacific ocean, and finally it would be delivered to the man to whom it was addressed." When it is remembered that it was as late as May 27, 1844, that the electric telegraph was first brought into practical use, what has been accomplished in bringing about the neighborship of nations challenges credulity.



* * The Schenectady Gas Light Company have ordered, through Mr. C. L. Levéy, 61 Broadway, a 35 lighter of the American system of arc lights.

* * J. M. Lennon & Co., manufacturing electricians, have opened an office at 224 Washington street, Minn., and will make a specialty of erecting electric light plants.

* * The House of Representatives at Washington is to have the Sawyer-Man system of incandescent lighting, and the engine will be furnished by the Ball Engine Company, of Erie, Pa.

* * The *Practical Mechanic*, an illustrated monthly journal, is to be published at Worcester, Mass., by Messrs. F. S. Blanchard & Co. It will be devoted to mechanics, engineering, electrical and industrial news.

* * The Willimantic Electric Light Company, of Willimantic, Conn., operating the Waterhouse system, have added another dynamo, in order to be ready for the early fall trade, and are already filling same with new customers. They supply both the arc and incandescent on same circuit.

* * The experiment made by the Union Electric Company, at Lykens Coal Mine, near Wilkesbarre, Pa., has proved a success beyond all doubt. The loaded and empty coal cars in the mines are now propelled by electric motor instead of by the old-time mule or locomotive. Intelligent miners say that the use of this electric system will thoroughly revolutionize mining in this country.

Monkeying with an Electric Battery.

Down on the Asbury avenue pavilion at Asbury park there is a colored man employed as a bootblack. In connection with his bootblacking he also takes care of the scales on which people are weighed who are possessed of an inordinate desire to know whether the sea air agrees with them. An electric battery has also been placed on the pavilion, and the colored man superintends the shocking of curious people. Among the many who took a shock was an old colored woman weighing about 300 pounds. When she took hold of the machine the sensation caused her to scream. Her cries attracted a crowd and excited the bootblack so that he lost his head, and instead of pushing in the knob of the battery to lessen the force he pulled it out, and so turned on the full power of the battery on the poor woman. The woman redoubled her cries until a good Samaritan in the crowd took the instrument and turned off the electricity. The woman moved away with a grieved air of having been a victim of a confidence game, and the bootblack gave out that he was a bad man for colored folks to monkey with.

Electric Motors in St. Louis.

"We will have three electric motors running this month," said Capt. Robert McCulloch, of the Lindell Railway, St. Louis. "We have sent up to the depot this morning for part of our storage batteries, which have just arrived. The company making them is far behind in its orders. That has delayed us some. Then the motor companies have been slow. Mr. Sprague, of the Sprague Motor Company, told Mr. McKittrick, when he was in New York, that he would not send his motor out here until it had been adjusted in New York and Philadelphia, so that the man who will have charge of the work there will come out here, and he will be saved the experimental part of the work. I understand the Brush motor is almost ready, and Mr. Possons, the manager of the company, is so much interested in the experiment that he will himself come over here to witness the test."

The Lindell Railway Company has put $5,000 into the batteries, $2,000 into the two electric cars, and $1,500 into one of the new motors, so far.

The Baker Automatic Governor.

In answer to a clamor from the general public, for some system by which an incandescent lamp could be placed on an arc circuit, the ingenuity of inventors has been brought to bear, and many devices have been submitted for this purpose. These to a great extent have had their day, and been relegated to the scrap heap of the laboratory or the shelf of the curious.

Among those which deserve and are earning a lasting reputation, is the Baker governor, which is shown in the cut herewith.

A short description in connection with the sketch will make its action plain.

Commencing with the separating switch on the arc wire, which completely removes the apparatus from electrical or mechanical contact with the main line, when the governor is out of service the current is carried to the top binding post at the upper right end of the cut, thence through the compound solenoid beneath the binding screw on the same side, from there to the binding post below the solenoid; thence up to the top of the box, through to a rear contact with the resistance coils, which stand vertically behind the partition or back of the box. These coils, one for each lamp, are coupled in multiple arc. Returning to the bottom binding post, a second contact is made with one side of the incandescent line, the opposite side of the incandescent line coming to the binding post at the lower left side of the box, which is also connected to the upper left binding post as shown, and thence to the other main line wire.

From the lower left binding post a connection carries the entire current to the commutator, shown in the upper center of the cut, and from this last individual contact is made to each of the resistance coils in the rear as the commutator is revolved.

The regulating current circuit is in the form of a shunt, connected from the lower right binding post to the lower left post, and travels in a direction opposite the main current, and thus neutralizes the force of this upon the magnet.

Of course any disturbance in the electrical balance will give to the armature greater or less pull, and revolve the commutator to restore the balance by cutting in or out resistance.

Experience has shown that these principles are philosophical, and results, where boxes have been in use constantly for months, are highly satisfactory. One plant in Chicago, which has been in nightly service since the first part of February, has not cost a single lamp, nor an expenditure of one cent for repairs.

For further information, address Baker Electric Company, 114–116 Wabash avenue, Chicago.

The Great "Lock Up" by the United States Treasury Department, and Increasing at the Rate of Over Ten Millions a Month.

Messrs. Harvey Fisk & Sons, well-known and reliable bankers of this city, have issued the following circular relating to the unnecessary lock up of funds in the U. S. Treasury. As every one is aware this matter should have received more serious consideration from the last Congress:

The situation is startling. If allowed to continue every interest will feel it. Every foot of land will become of less value, every bushel of wheat, every bushel of corn, every pound of cotton will decline in value. On the other hand, if the administration goes to work under the powers given it by existing laws, and earnestly tries to frame new laws for the consideration of the incoming Congress, we shall see such an era of prosperity as was never before witnessed in this land.

THE SITUATION.

The fact is that with the exception of some twenty millions deposited by the Treasury with national banks, there is now "locked up," out of use, and drawing no interest, in the United States Treasury, the vast sum of nearly three hundred and forty million dollars ($340,000,000).

One hundred millions of this vast sum the Treasury is obliged to keep under the laws as a reserve against United States notes.

Upwards of another hundred millions of this vast sum is retained to redeem the notes of national banks failed or retiring circulation.

There is no law requiring the Treasury to keep this sum locked up. It is only required to redeem the notes as presented.

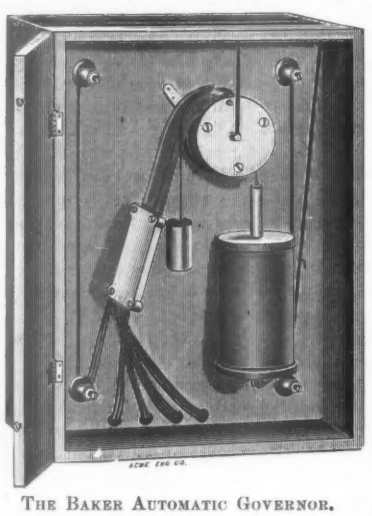
It will be years before these national bank notes will all come in, and it is more than likely that 3 to 5 per cent. will never be presented.

Should this money lie idle all these years? If it must, then there is some defect in the national banking law which ought to be corrected.

Why Congress should have put it in the power of the national banks to use the Treasury in this way is a serious question.

Of the balance of this vast sum there is retained to meet past due bonds, disbursing officers' drafts, P. O. Department accounts and divers appropriations, nearly seventy million dollars, just as if the Treasury was not receiving from the people every month upwards of twenty-five million dollars to meet all these things.

For all the above the Treasury Department may set up a valid excuse; but, if so,



THE BAKER AUTOMATIC GOVERNOR.

the next Congress should see that something is done to utilize as large a part of this $270,000,000 as is consistent and safe.

Still remaining is $70,000,000, for which "lock up" there is no reason or law except the ruling or wishes of the Treasury Department.

It is well for the people to know how the Treasury stands.

The following figures are from the official statement issued by Secretary Fairchild, June 30, 1887.

IN THE TREASURY.

Gold Coin and Bullion	$278,101,106 26
Silver-standard dollars, Bullion, Trade Dollars and Fractional Silver, ...	249,495,597.66
United States Notes	28,783,796.79
National Bank Notes.....	197,046.00
Deposited in National Banks	22,991,302.33
	$579,568,849.04

At same date the Treasury had outstanding,

Gold Certificates.....	91,225,437.00
Silver Certificates....	142,118,017.00
U. S. Notes Certificates.....	8,770,000.00
	$242,113,454.00
Thus leaving, with the exception of the little part in the National Banks, "Locked Up" in the Treasury, ...	$337,455,395.04

With an outstanding debt of over one thousand millions on which the people are taxed $44,638,466 yearly for interest payments, we would submit the simple question:

Is it just to the people to keep, year in and year out, $337,000,000 locked up in the Treasury, drawing no interest, and doing no good?

Since the issue of our circular of June 16—"What use shall the Government make of its Surplus,"—we have received hundreds of newspapers and communications from all parts of the land on this subject, all showing a deep interest and concern over the Treasury surplus. By far the larger majority think as we do that the sooner the "rebellion" debt is cleared out, bought up, paid off and forgotten, the better for the whole country.

It would be far better for the country if $150,000,000 of this money was immediately used to reduce the interest bearing debt, even if the Government made nothing by it; but, it can not only reduce the debt, but save millions in future interest payments by doing so.

—— The Pacific Julien Electric Company, San Francisco, has been incorporated for the purpose of carrying on electrical business. The directors are Irwin G. Stump, James H. Dobinson, H. B. Loud, E. W. Lesser and Fred. M. Pickering. The capital stock is $1,000,000, divided into 10,000 shares.

Troubles of Stockholders in an Underground Wire Company.

A hearing was given by Judge Field of the Supreme Court on a bill in equity brought by Michael Meehan *et al.* against John H. Walsh for the appointment of a receiver and an injunction to prevent Mr. Walsh from disposing of certain property now in their possession. It appeared that Michael Meehan, Caleb W. Ayer and John H. Walsh, formed a partnership to promote an enterprise for laying underground wires in the city of Boston. Subsequently a company was organized under the laws of the State of Maine, known as the American Conduit Company, and at a later period the American Conduit and Construction Company. The plaintiffs claim that Mr. Walsh holds the property in his own right, and refuses to deliver it as he agreed to do. Mr. Walsh says he is the treasurer of the American Conduit Company, and that an agreement to convey to him two thousand shares of stock has not been carried out. The judge declined to appoint a receiver.

Boston Electric Club.

REGULAR MONTHLY MEETING.

In pursuance of a notice to that effect, the members of the Boston Electric Club congregated on the 4.30 boat from Rowe's Wharf, bound on an excursion down the bay to Nantasket.

Although it had been oppressively hot all day in town, there was a cool breeze blowing across the harbor, which was dotted with white-winged yachts gathered there to pay their respects to General Paine's new cup defender, the Volunteer.

This occasion was the first time the members of the Boston Electric Club had met formally, and, as the members and their guests gathered upon the quarter-deck, many were the old and half-forgotten acquaintances renewed, and slight acquaintances strengthened by the bond of good-fellowship which had brought them together.

Nor was the occasion without the touch of a gentler element, for the wives of several of the members honored the club with their presence, and held a little court, surrounded by gentlemen who vied with one another to make it pleasant for their fair visitors.

Having arrived at their destination, the party went at once to Hotel Nantasket, where an ample banquet awaited their coming.

Over the black coffee Mr. Frank Ridlon, president of the club, called the meeting to order, and requested the treasurer to make his monthly report, which was accepted.

Some other business relative to the appointing and furnishing of the new clubrooms was transacted, and the meeting adjourned, to return to the city by boat. Some of the musical members of the club contributed to the enjoyment of the occasion by an impromptu rendering of a few songs by Kenkel, Schubert and others, interspersed by some of a less classical nature.

The evening was perfect, and the nearly full moon looked down on a party of people well pleased with one another and their new social relation.

Among other gentlemen present were Messrs. Frank Ridlon, A. F. Mason, Reuben T. Robinson, W. J. Hammer, E. L. Caldwell, C. M. Ransom, P. H. Alexander, J. E. Talbot, R. F. Ross, T. F. Baker, A. H. Chapman, W. T. Barker, W. J. Denver, H. B. Lytle, C. W. Holtzer, Edward Blake, A. G. McCluer, H. H. Eustis, Allan V. Garratt, E. W. Rice, Alexander Ekstrom, Fred. M. Kimball, Sml. Smith, H. J. Pettengill, P. Keilholtz, C. A. Perkins, Fred. A. Gilbert, G. A. Pierce; also Messrs. Sprague, Ulmer, Thornbury, Bottomley, Law and Toland.

Mr. Marmaduke M. M. Slattery, in the afternoon, saw fit to run a race with an express train on the Boston and Lowell Railroad, and, contrary to the hopes and expectations of his numerous friends, he came out only second best, thereby causing sorrow to every member of the club, for he was obliged to take a later boat.

Mr. G. W. Adams came down the bay in his sloop yacht, arriving about an hour later than the other members. The arrival of these tardy members was hailed with an enthusiasm which must have taken away much of their disappointment at being late.

Growth of the Electric Club.

THE SUCCESS OF A YOUNG ORGANIZATION—ITS OBJECTS AND MEMBERS.

[*From The New York Tribune, Aug. 1*]

"Yes," said the secretary of the Elec ric Club, "our success in the establishment of the organization has been somewhat remarkable. We have been in existence less than a year, and we have 280 members who are residents of New York, besides a number of corresponding members in other cities."

"Are they all electricians?" asked a *Tribune* reporter. "If so, the air of your club room must be so charged with professional genius as to be positively dangerous to an outsider."

"No, no," replied the secretary. "I think that may have been the rock on which earlier attempts at forming an association were wrecked. The Electric Club has been established on a fairly broad basis. I believe it does include in its membership all the best electricians of the country, but it embraces also those who are interested in electricity from other points of view, social, commercial, scientific and educational. It takes in men who are studying electricity, others who are developing it mechanically, still others who occupy themselves with electrical inventions, and finally those who believe in it and advocate its use."

"Does not everybody do that?"

"Electricity is recognized as a medium of illumination, but its utility as a tractive force is championed by comparatively few. We have in our list of members several gentlemen who are actively engaged in that very line, like Theodore N. Vail, who is president of the Electrical Accumulator Company. By the way, it is this company which lights the vestibule train to Chicago on the Pennsylvania Central. The officers of the club are well-known men Our president is Henry C. Davis, of the Sawyer-Man Electric Light Company; and we have four vice-presidents, Thomas A. Edison, of whom I need say nothing; George W. Hebard, president of the United States Electric Lighting Company; John B. Powell, General Manager of the Brush-Swan Electric Light Company, and George L. Beetle, of the Western Electric Company."

"Have you a permanent club house?"

"We have just engaged No. 17 East Twenty-second street, a large four-story brown-stone house with an imposing front of thirty-five feet. It has a fine entrance with a broad stairway. Our men are now in it, putting in our furniture, laying down carpets and getting ready for the house warming, which will be some time in September. We issued bonds for $25,000 for the furnishing only a short time ago, and $18,000 has been subscribed for, and we have verbal promises for the balance. Edison took bonds for $500 and others of our leading men did the same thing.

"We have regular monthly meetings, and during the summer three of these are held at the Hotel Brighton, Coney Island. On these occasions we have first a dinner, and then a paper with subsequent discussion. Our last Coney Island meeting was on July 21, and the topic presented by the speaker of the evening was the effect of magnetism on watches and marine chronometers. In the winter we hope that our meeting will be a feature in the social life of the city, and we intend to discuss every improvement in electricity, every electrical discovery, and every important work on the subject. Many of our members will contribute original inventions and scientific views. Dr. Moses, one of our band, recently made a seismometer for recording shocks directly underneath the instrument, but it has not yet been brought before the notice of experts in earthquakes, as the Doctor is abroad."

—— The Westinghouse Machine Company averages shipments of nearly 60 engines per month, the average size being about 45 horsepower. They have been suffering severely from lack of foundry capacity since the recent fire, but the new foundry, nearly completed, will enable them to turn out at least 100 engines per month.

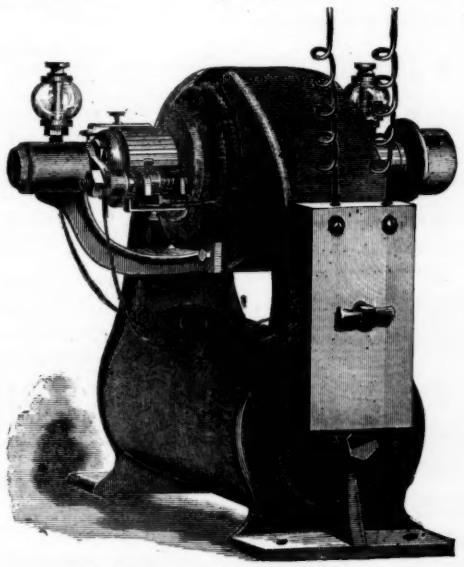
The Motor of the Cleveland Motor Company.

In form the Cleveland motor presents a compact and substantial appearance, and yet neat in outline. It is somewhat of a departure from the general run of motors in several points. It has but one spool, and that is the bulky portion forming the lower portion of the motor, while the armature is supported above. This brings it in excellent position for attention.

The frame of the Cleveland is made of a core of soft hammered charcoal iron, two pole pieces, cast from the same pattern, and the two brackets supporting the armature. As will be noticed, the lower portion of the pole's pieces are extended into feet upon which the motor stands. Mechanically it is well put together. Every part is planed, turned or bored to exact measurements, so that the motors of the same size are interchangeable.

Besides the cap screws, of which there are but six in the whole motor, taper pins are so placed that the whole comes exactly together, even before the screws are entered.

It has been an exceedingly troublesome thing to arrange and harmonize all the various mechanical sizes to the electrical sizes necessary. The Cleveland Electric Motor Company claim to have effectually done this. To illustrate: A one horse power frame has five different spools and five different armatures, each representing a type, as a 6¼ ampere, a 95 ampere current or a 110 volt circuit; each of these spools or armatures exactly fit the frame, and it is possible to change the motor to run on the five different circuits in ten and fifteen minutes.



THE CLEVELAND ELECTRIC MOTOR.

Electrically the armatures are, as a rule, of the plain Gramme, type although armatures for some purposes are made on the drum plan.

Throughout all these changes the electrical balance between amount of iron and copper on armature and field is so carefully computed that no undue heating nor any sparking is entailed.

As for regulation, the constant potential machines being shunt wound are automatic, and hence self-regulating.

The starting and stopping is easily accomplished by so winding and proportioning the fields, that in starting, the first move of the switch converts the motor in arc compound wound, the final converts it into a plain shunt machine. To stop it is only necessary to quickly turn the switch back to its original position. This simple and effective method does away with all the complications generally hung on the adjacent walls.

The arc motors are in the main plain series, and are regulated by either a hand switch or by the governor, as suits the requirements.

The history and daily working of the motor is all-sufficient proof, and the demand is very satisfactory to all interested. It might be stated that the company is now estimating on several electric tramways, and intend to vigorously push in this direction as well as in that of stationary motors.

—— Portland, Oregon, is petitioning the council for more electric lights.

—— A new incorporation is the Belleville (Kan.) Electric Light Company. Chauncy Perry, S. C. Crummer, G. W. Stevenson are the incorporators.

—— The Thomson-Houston Electric Light Company, of Quincy, Ill., are enlarging their plant, and have just ordered another 12×12 Ball engine.

—— The Austin Water, Light and Power Company have just given an order for one 13×12 and two 10×12 Ball engines to run their electric plant.

—— Messrs. Chas. A. Schieren & Co., of New York, have supplied the following electric light plants with their double electric belts: Richmond, Va.; Winston, N. C.; Boise City, Idaho; Augusta, Ga.; Rock Island, Ill.

—— A dispatch from Chicago says: Mr. Pullman proposes to introduce here the system now in vogue on one or two of the English railroad lines of storing electricity for the lighting of the cars from the friction of the car wheels He has brought an expert over, who will soon set to work on a series of experiments at the car shops at Pullman, Ill.

—— On the night of June 25, the extensive factory of Brownlee & Co., manufacturers of cross arms, pins, brackets, etc., was entirely destroyed by fire. The firm commenced to rebuild at once, and had a part of their machinery running on July 12, and had the entire plant replaced within 30 days. The new factory is the largest and most complete of its kind in the country.

The New Carbon Company.

The Standard Carbon Company, whose announcement appears in this week's issue of the REVIEW, commenced business under the most favorable auspices. They have a strong combination of skill, experience and talent. W. H. Boulton's reputation as a carbon manufacturer is a tower of strength, while H. A. Tremaine, although later in the field, has shown marked ability, producing a carbon the sale of which has only been limited by the capacity of the Cleveland Carbon Company's Works. These two gentlemen, we are informed, are freed from all the cares of the business aside from the manufacturing department, and purpose to produce a better carbon than has yet been made. D. A. Dangler's well-known business ability is a guarantee of careful, prudent, and able management.

The company are now turning out 100,000 carbons per day, and within thirty days purpose to have an output of 150,000 carbons per day; the amount of goods that they purpose to make is astounding, but the company's representative informs us that in order to make a really good carbon at the low prevailing prices a large amount of carbons must be made under one management. The Company is moving in the right direction, and it is safe to predict for them a brilliant future. The demand for carbons is rapidly increasing, and there is ample business for the manufacturers.

ELECTRIC LIGHT NEWS

—— Electric light machinery will be placed in the Natchez cotton mills.

—— The City of Ypsilanti, Mich., will have the street lighted by the electric light using towers.

—— At Greenville, S. C., the gas company will put in a plant of 60 arc lights, using the Brush system.

—— The Sharpsburg Electric Light Company, of Pennsylvania, has been incorporated by J. G. Nertz, and others.

—— The Webster (Mass.) Electric Company has been incorporated by N. T. Hurlbut, Waldo Johnson and others.

—— The Capital Gas Company, Sacramento, California, has invested in fifty Waterhouse arc lights and dynamos.

—— The Chattanooga Electric Light Company has purchased the machinery for their incandescent plant; Westinghouse system.

—— At Norfolk, Va., the bids for lighting the streets with electric lamps have been rejected, and new proposals will be issued at once.

—— Chicago is slightly excited over the report of the city gas inspector, which would indicate that the city is paying about $60,000 more per annum for gas than it should.

——The Buffalo council committee on lamps has voted to increase the number of electric lights, and has granted the United States Electric Company the privilege of erecting a tower in the Circle.

—— The Empire City Electric Company has moved its wholesale and manufacturing departments to 15 Dey street, where three floors will be occupied. The retail department still remains at 779 Broadway.

—— The Brooklyn Subway Commission has approved the plans of the Brooklyn Electric Light and Power Company, of which N. L. Cocheu is general manager, for placing their wires underground in the Eastern District.

—— The Brush Electric Light Company offers to the city of Topeka, Kans., to erect seven towers, 150 feet high, on each tower eight Brush arc lights, for $9,000 yearly for five years. This offer the city should accept, and take rank as a thoroughly well lighted city.

—— The Newburgh, N. Y., Electric Light Company, of which Mr. E. R. Hasbrouck is the wide-awake manager, is now running 185 Thomson-Houston lights, 80 of these being in use by the city. The company is also furnishing quite a number of the Thomson-Houston incandescent lights this being a very popular feature with the citizens of Newburgh.

—— The Hon. Edward A. Maher, manager of the Electric Illuminating Company at Albany, received an electric shock. He had turned off the electric current in order to change one of the lamps, and when he had the change about completed, some one inadvertently turned on the current, the result being that Mr Maher was badly burned on the left forearm and hand besides receiving a severe shock. He soon recovered and had his wounds dressed by a physician who was summoned. Mr. Maher's friends congratulated him on his escape, although he seemed to treat the matter lightly.

—— There is a possibility of litigation between the Brush Electric Light Company and the Board of Public Works of Detroit. The Brush Company claim that the city cannot force them to put their wires underground, and if the board stops their workmen putting up poles and wires the company will sue the members of the board individually for damages. The board of public works, officers of the electric light company and Mayor Chamberlain held a consultation at which no understanding was arrived at beyond a distinct idea that each party would do as it pleased.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JULY 26, 1887.

367,042 Acoustic telegraph; John H. Irwin, Philadelphia, Pa.

367,069 Electric locomotive; Edward S. Shaw, Cambridge, Mass.

367,080 Armature for dynamo-electric machines; Merle J. Wightman and Oscar Urban, Hartford, Ct.

367,081 Dash pot for arc lamps; 367,082, Switch and automatic cut-out; Merle J. Wightman and Hermann Lemp, Hartford, Ct., assignor to the Schuyler Electric Manufacturing Company, of Connecticut.

367,164 Insulator; Henry K. Ruger, Bay St. Louis, Miss.

367,205 Electric test system; Joseph W. Frost, Rochester, N. Y.

367,219 System of telephonic intercommunication; John A. McCoy, Medford, Mass.

367,270 Electrically-actuated vibrator; Frank B. Colman, New York, N. Y.

367,291 Galvanic battery; Henry I. Harris, Islington, county of Middlesex., assignor to John Joseph Walsh, London, England.

367,332 Means for individually controlling a number of devices of electricity; Channing Baxter, Brooklyn, N. Y.

367,341 Electric Smelling bottle; Lloyd B. Fuller, Chicago, Ill., assignor of one-half to William S. Mitchell, same place.

BUSINESS NOTICE.

"In making the statements which follow we can verify each and all of them as facts. Mr. Edward P. Thompson, of Temple Court (7 Beekman St.,) New York, is a good man to bring your patent cases to, for he is thoroughly versed in all the ins and outs of a Patent Attorney's duties. The following are some of his qualifications: Graduate of Stevens Institute as Mechanical Engineer. For four years tutor of classes of young men in mathematics and experimental physics at Elizabeth, N. J. Served professionally as Electrician and Chemist in the Swan Electric Company of New York for two years. Because of past successes as a Patent Attorney at 13 Park Row, New York, was appointed to succeed N.S. Keith, of the patent agency of the *Electrical World* and Associate Editor. N. S. Keith is known as the Translator and Reviser of Schellen's Treatise on "Dynamo Electric Machinery." Mr. Thompson for two years personally prepared and prosecuted all the patent business of *Electrical World's* Patent Agency, and is the author of a series of articles in said paper upon "Analytical and Systematic Method of Inventing," which were widely known and favorably received. Mr. Thompson is a member of American Institute of Electrical Engineers and American Society of Mechanical Engineers. He is author of the "Expansion of Polynomials," which the ablest mathematicians of the world universally commend." —*New York Observer*.

BUSINESS NOTICE.

Rand's New York City Business Directory for 1887-8 has just been issued by the New York Standard Directory Company. The work contains a full and complete list of the Importing and Jobbing Merchants, Manufacturers, Banks, Bankers, Insurance Companies and Business Concerns generally of the metropolis, classified in a convenient and systematic alphabetical order. It contains 574 pages, double columns, nonpareil type, printed on highly-calendered paper, and handsomely bound in embossed cloth. It tells where to get anything, from a needle to a steam engine, direct from the importer or manufacturer, and will be found to be indispensable to those buying goods or having correspondence with New York city business houses. The present volume is the best ever issued, and is of special value to the merchants and manufacturers of the country. The price is one dollar per copy, and will be sent, postage prepaid, to any part of the world by the publishers.

THE N. Y. STANDARD DIRECTORY CO.,
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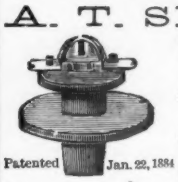

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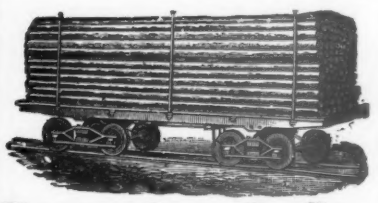

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